UMASS/AMHERST
312066 0278 0192 3

MASS. EA40.103:995

WATER QUALITY REPORT 1995

METROPOLITAN DISTRICT COMMISSION

DIVISION OF WATERSHED MANAGEMENT

QUABBIN RESERVOIR WATERSHED
WARE RIVER WATERSHED

David E. Balfour, Commissioner
Joseph M. McGinn, Esq., Director

Environmental Quality Section

Patricia Austin, Boston

Robert Bishop, Quabbin
Scott Campbell, Quabbin
David Chandler, Quabbin
Peter Deslauriers, Quabbin
Matthew Hopkinson, Quabbin

ACKNOWLEDGEMENTS

The text of this report was substantially written by Scott A. Campbell, Environmental Engineer. Special appreciation for their time and effort is extended to David Chandler for his assistance with data collection and analysis; to Robert Bishop and Peter Deslauriers for their comments and input on the water sampling program and analysis; to Philip Lamothe for the G.I.S. information and maps; to Joseph P. Burek for Quabbin flows and climatological data; and to Karen M. Orr for clerical assistance.

Table of Contents

Section Page

Introduction

1.0 Summary.....1

2.0 Water Quality Sampling Program.....2

3.0 General Discussion.....3

4.0 Special Studies.....4

5.0 Closing Remarks.....5

Tables

1) 1995 Quabbin Tributary Sampling Stations
2) 1995 Ware River Watershed Tributary Sampling Stations
3) Standard Methods Used for Field and Laboratory Analysis
4) Avg. Concentration Vs. Surface Water Quality Standards
5) 1995 Precipitation Totals - Winsor Dam
6) A Study of pH and S.M. Alkalinity 1964 - 1994
7) Reservoir Facts

6.0 Water Quality Data Tables.....6

6.1 Quabbin Reservoir Tributaries
(206) Quabbin Reservoir at Shaft 12
(201) Quabbin Reservoir at Outlet Building (CVA)
(211) West Branch Swift River at Route 202
(213) Middle Branch Swift River at Gate 30
(216) East Branch Swift River Rt. 32A
(216E-1) Small Trib on Route 122 east of grange
Boat Cove Near mouth
Gates Brook at mouth
(211B-X) Cadwell Creek at mouth
(211A) Atherton Brook at Route 202
(212) Hop Brook Gate 22
(212-X) Hop Brook at mouth
(215A) West Branch of Fever Brook - Womens Fed.
(215) West Branch of Fever Brook - on West Road
(216B) Rand Brook at Route 32A

6.2 Ware River Tributaries
Ware River at Shaft 8
Ware River at Shaft 11A
(111)(B6) Quenn Lake at road culvert
(112)(B2) Burnshirt River at Williamsville Road
(103)(B1) Burnshirt River at Route 62
(115) Brigham Pond at outlet
(116) Asnacomet Pond at outlet
(116A) Asnacomet Pond at beach
(107) West Branch Ware River at Route 62

(108) Eats Branch Ware River at New Boston
(105) Ware River at Barre Falls
(104) Canesto and Natty Brooks at junction Rt. 62
(109) Longmeadow Brook at mouth
(121) Mill Brook at Charnock Hill Road
Moulton Pond below dam
(110) Long and Whitehall Ponds at outlet
(119) Demon Pond at outlet
(102) Parker Brook near mouth
(N1) Natty Pond Brook at Hale Road

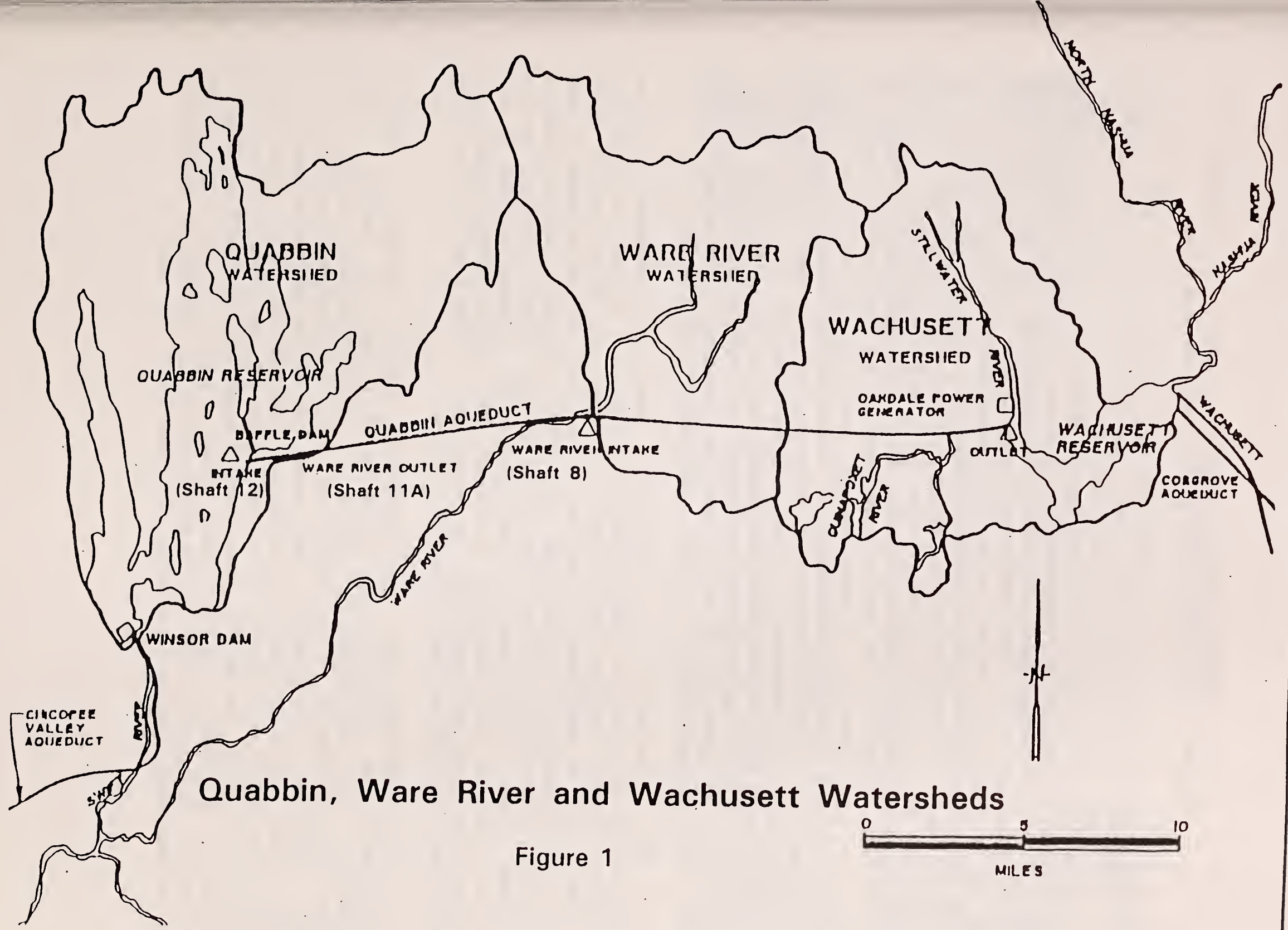
6.3 Other - MDC Drinking Water
Visitor Center fountain
Main Office fountain
Blacksmith Shop fountain
Quabbin Forestry Building tap
Cemetery tap
Quabbin Hill tap men's room
Ware River Office
Revet samples

6.4 Special Investigations
Miscellaneous field studies

6.5 Quabbin Reservoir Stations
(202) Winsor Dam
(206) Shaft 12
Den Hill

Appendices

1) References
2) Water Quality Field Survey Reports



Quabbin, Ware River and Wachusett Watersheds

Figure 1

WATER QUALITY REPORT: 1995
QUABBIN RESERVOIR AND WARE RIVER WATERSHEDS

INTRODUCTION

The Division of Watershed Management (DWM) of the Metropolitan District Commission is responsible for managing and maintaining over 303,000 acres of land and water that make up the MDC watershed system (Figure 1). The DWM's primary goal is to protect the quality of water collected as runoff drained from these lands. In doing so, the DWM actively pursues watershed protection efforts by controlling or mitigating pollution threats from activities conducted on watershed lands. As part of this effort, source waters are routinely sampled by the Environmental Quality Section of the DWM. Sampling of source waters enables DWM staff to detect pollution problems at an early stage, monitor trends and changes resulting from outside environmental factors, and assess compliance of tributaries and the reservoir supply with all applicable state and federal requirements. This report focuses on the Quabbin Reservoir and Ware River data and analyses for the 1995 year which saw over 1,700 water samples collected. A companion report which describes the results of water quality testing in the Wachusett Reservoir drainage basin is also available from the DWM.

The Quabbin Reservoir is a 412 billion gallon impoundment of the Swift River serving as the principal supply of water for over 2.5 million people across the state. Water is distributed both eastward to the Wachusett Reservoir via the Quabbin Aqueduct, and in a southwesterly direction to three Western Massachusetts communities via the Chicopee Valley Aqueduct (CVA). Water leaves via two intake structures, one being the CVA intake located at the southern end of the reservoir on Winsor Dam and the other midway up the eastern arm at Shaft 12 in Hardwick. The two intakes and watershed boundaries are shown in Figure 1.

Water from the Ware River may supplement Quabbin Reservoir levels via diversions through the Quabbin Aqueduct in Barre. The Aqueduct, also depicted in Figure 1, stretches 24.6 miles from Shaft 12 in Hardwick to the upper end of the Wachusett Reservoir in West Boylston. Because of the elevation differences between the Ware River in Barre and the Quabbin Reservoir, flows from Ware River are capable of being diverted westward, by gravity flow, via Shaft 8 in Barre to Shaft 11A located east of the baffle dams in Hardwick. By diverting the lower quality water of Ware River back to Quabbin Reservoir, residence and settling times are dramatically increased essentially providing treatment to the water.

1.0 SUMMARY

During 1995, water leaving the Quabbin Reservoir met all source drinking water criteria established under the DEP/EPA surface water filtration waiver. DEP/EPA compliance requires that 90% of water samples collected over a six month period maintain a fecal coliform concentration equal to or less than 20/100ml. In addition, turbidity levels are not allowed to exceed 1 NTU without demonstrating that the higher turbidity does not interfere with disinfection or microbiological determinations (refer to 310 CMR 22.20A for specifics). Exceedence of the 20/100 ml fecal coliform concentration occurred only once during the year on June 12th at Shaft 12 in Hardwick (MWRA also recorded a fecal coliform violation at the CVA on October 6th). Turbidity levels remained consistently and well below the 1 NTU standard.

Fecal coliform levels at Shaft 8 in Barre violated the 20/100 ml fecal coliform concentration standard in 2 of the 13 (15%) samples collected during the allowable diversion period October 15th to June 1. Turbidity levels during this time period also exceeded the 1 NTU standard on four occasions. From June 5-8th, MWRA had obtained DEP permission to divert 237.3 million gallons of Ware River water to Quabbin Reservoir.

2.0 WATER QUALITY SAMPLING PROGRAM

Water samples are collected routinely throughout the year at the start of each work week. Sample collection is generally performed regardless of weather conditions, thereby providing a good representation of various flow conditions and pollutant loadings. The 1995 sampling program saw no changes made from the previous year in sampling locations, frequency, and methodology. A total of twenty-one streams and seven ponds located throughout the two watersheds, and, five sites located on or representing water withdrawn from the reservoir (refer to Tables 1 and 2 and accompanying figures) were routinely sampled to characterize the quality of water entering and leaving the reservoir.

Environmental Quality staff utilize various instruments including a dissolved oxygen meter to gather field measurements of stream temperatures and dissolved oxygen levels. A Hydro-lab Surveyor II unit is employed at reservoir sampling stations to gather depth profiles of temperature, dissolved oxygen, specific conductance, and pH. Most of the water quality testing is carried out by DWM staff in Belchertown at the Quabbin Section Lab. In-house laboratory analysis of tributary samples includes a bi-monthly test for total and fecal coliform, alkalinity, pH, specific conductance and turbidity. DWM personnel also run a quarterly analyses for color, chloride, hardness, total and fixed solids, and iron on each sampling station. Revet Laboratory in Framingham, Massachusetts, provided contract laboratory services for the DWM to perform nutrient, metal and volatile organic compound analysis on special samples collected during the year (no annual nutrient and metal samples were collected). Standard methods referenced in Table 3 are used for field sampling and laboratory analysis.

All data collected is recorded in permanent laboratory books located at the Quabbin Water Quality Lab and transferred as well to an electronic database. Since the origins of the Metropolitan District Commission, sixty years worth of water quality data has been compiled on most major tributaries contributing to the Quabbin Reservoir and Ware River.

3.0 GENERAL DISCUSSION

Water quality data for each sample station has been attached and can be found in Section VI. In conducting a qualitative review of the 1995 data, yearly averages for pH, bacteria, and dissolved oxygen were compared to Massachusetts Surface Water Quality Standards (MSWQS) for Class A waters. The standards were established to ensure that water quality is not degraded to a level below its intended use and that the biological integrity of the watercourse is maintained.

AMONG QUABBIN TRIBUTARIES:

- Seven of twelve (58%) tributaries had pH averages below the range specified under MSWQS (6.5 to 8.3 units).
- Seven of thirteen (54%) had average fecal coliform concentrations exceeding the MSWQS of 20/100ml.
- Two of twelve (17%) had dissolved oxygen saturation levels averaging below the MSWQS of 75%.

AMONG WARE RIVER TRIBUTARIES:

- Thirteen of seventeen (>75%) had pH averages below the range specified under MSWQS (6.5 to 8.3 units).
- Thirteen of seventeen (>75%) had average fecal coliform concentrations exceeding the MSWQS of 20/100ml.
- Four of the seventeen (23%) had dissolved oxygen saturation levels averaging below the MSWQS of 75%.

Ware River sampling stations that included sites from both tributaries and ponds, fared worse in the water quality comparison. The poorer quality may be contributed in part to a number of reasons ranging from increased watershed development to the greater degree of wetland influence on tributary streams. Table 4 lists each sample station with yearly averages for each parameter evaluated above. It should be noted that the use of averages can be misconstrued given the fact that a single storm event can introduce a significant pollutant load (particularly bacteria) that may not truly represent water quality in the receiving stream. Therefore, results must be interpreted cautiously with particular attention paid to yearly highs provided for each water quality parameter.

The 1995 sample year was unique in the fact that by the end of August, precipitation totals were nearly 6-1/2 inches below normal. The state was in the middle of an extended drought that saw nineteen consecutive days pass in which no precipitation had fallen (refer to Table 5).

The effect that the drought had upon water quality was most pronounced in looking at alkalinity levels within tributary streams. Alkalinity measures the water's ability to neutralize acid inputs and thus plays an important role in protecting the reservoir from acidification and subsequent mobilization of toxic heavy metals.

During 1995, alkalinity averages in four of the five major discharges into the Quabbin Reservoir increased by over an average of 200% from levels seen in representative years from 1964 to 1994 (see Table 6). These findings support previous studies (Yuretich, 1992) that had shown a logarithmic decline in alkalinity verses stream flow. Yet these increases were not uniform throughout the entire Quabbin and Ware River watershed. For instance, in looking at alkalinity levels in Hop Brook over the past 30 years, you will find that five year averages in each decade fluctuated at most by 2.3 units. Likewise, Shaft 12 sampling results (Figure 2) point out that an immediate "pulsing" effect was not present within reservoir alkalinity levels in 1995 (lag time identifiable in earlier years). The discrepancies might be explained in several ways as alkalinity levels are a factor of the availability of groundwater baseflow, mineral weathering of the surrounding soil, and the effect of reservoir lag time. Other site specific characteristics (e.g. slope, groundwater, input from wetland activity, etc..) also factor into the equation but extend beyond the scope of this report.

4.0 SPECIAL STUDIES

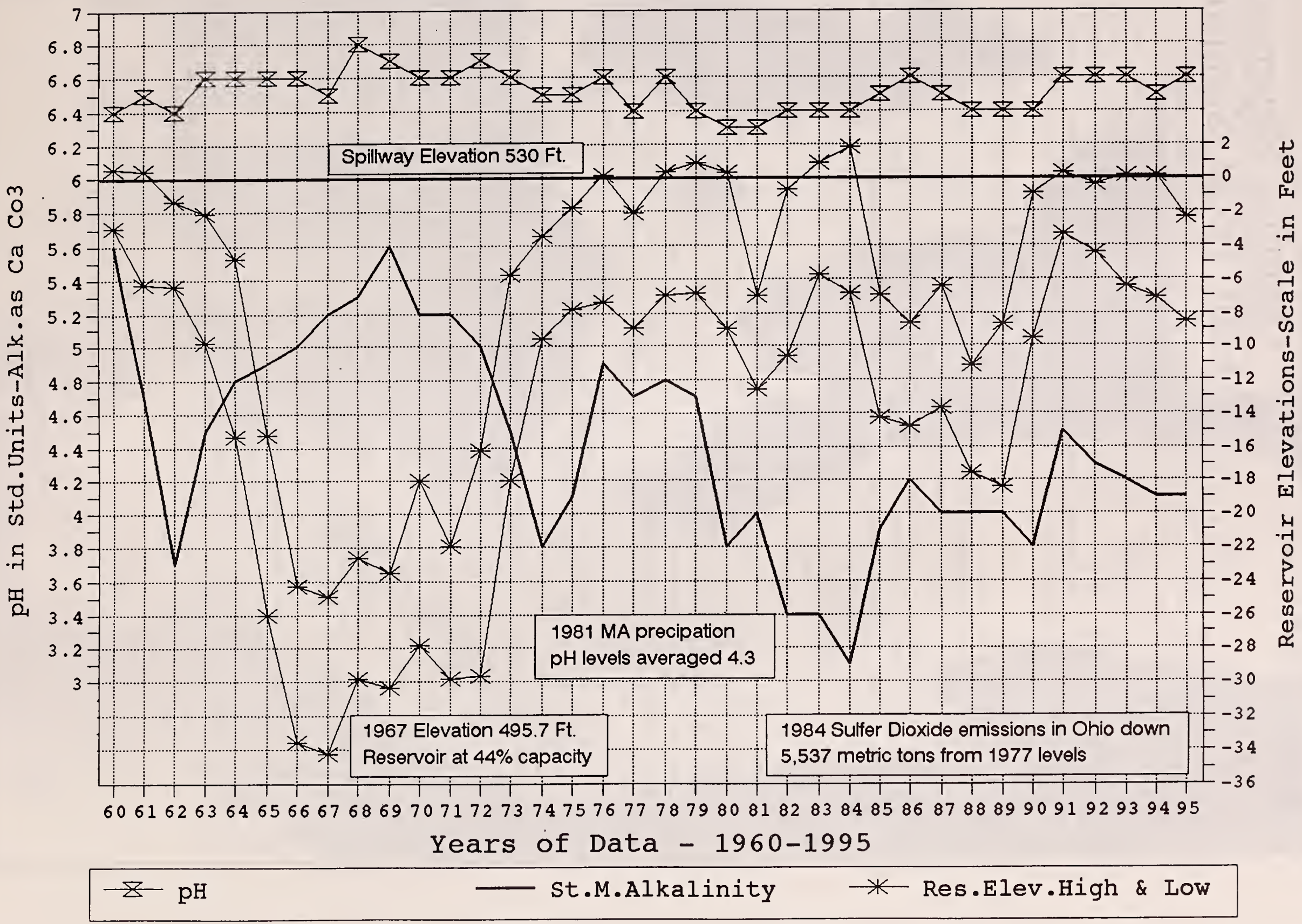
Gull Harassment Program

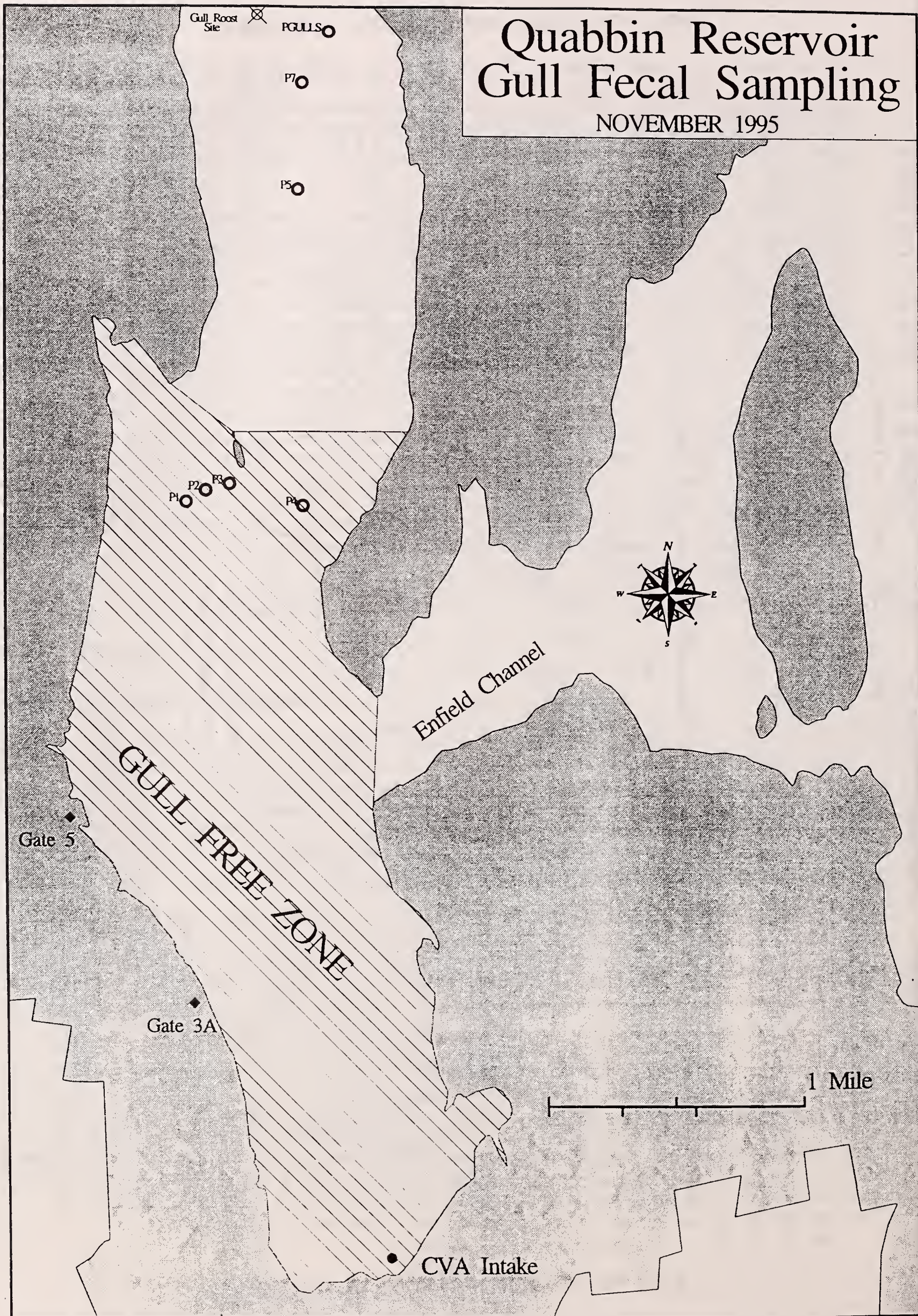
The CVA intake in recent years has been prone to fecal contamination from migrating, wintertime gull populations. The aggressive monitoring of bacteria levels entering the intake has been useful as a management technique in administering the gull harassment program carried out by the DWM. Harassment efforts have been aimed at moving roosting gulls away from the CVA intake area, thereby, lowering fecal coliform levels entering the aqueduct.

During this past year, the gull free zone surrounding the intake was extended one mile north to provide additional protection during unfavorable reservoir conditions when strong wind and wave action can carry undiluted bacteria loads into the intake. DWM staff and students from the University of Massachusetts conducted special reservoir depth and surface sampling in an attempt to track bacteria travel as it is released into the reservoir via roosting gulls. Sample sites and the gull roost site are shown in Figure 3. Initial findings of significance showed that the greatest concentration of fecal matter (17,500 colonies) occurred at a depth of 5 meters downstream of the previous night's roost site. A completed water quality model is expected to be presented to the DWM in March of 1996 by students from UMass.

Quabbin Reservoir at Shaft #12 (206)

Yearly Avg for pH & ALK, with elevation




Quabbin Reservoir
Gull Fecal Sampling
NOVEMBER 1995
Gull Roost Site
PGULLS
P7
P5
P1
P2
P3
P4
N
W
E
S
Enfield Channel
GULL FREE ZONE
Gate 5
Gate 3A
1 Mile
CVA Intake

Giardia and Cryptosporidium

Twenty two sites, focused primarily around the immediate vicinity of the CVA and to a lesser extent the other two intake structures at Shaft 12 and 8, were monitored for Giardia and Cryptosporidium. Water samples are being analyzed using the cartridge filtration immunofluorescence assay (IFA) method. This method has been regarded among experts as a very reliable oocysts detection method. However, results have been criticized because the viability and infectivity of the detected oocysts are not determined.

Water Quality Investigations

On nine occasions special investigatory samples were collected at sites where specific watershed threats were suspected to be impacting water quality. The results of these preliminary investigations are utilized by DWM to assist with environmental enforcement issues and to assess areas where water quality improvements can be made. These results can be referenced in the Water Quality Data tables under the Field category.

5.0 CLOSING REMARKS

As a general overview it can be said that most sample sites exhibited seasonal trends in each parameter analyzed. Parameters were most highly influenced by stormwater runoff, stream flows, and temperature. Another factor, wildlife populations, were also accountable as follow-up field surveys (appendix) and water quality results readily identified these sources of fecal inputs. However, other measurable impacts have been difficult to trace to a known source of pollution. These impacts have included those contributed from non-point sources and those that simply have not been fully understood. For instance, the random occurrence of elevated fecal coliform levels detected in Petersham Brook is unexplained due in large part to the limitations of grab sampling. Also, the apparent fall time, cyclic explosion of total coliform bacteria levels seen in MWRA water samples collected at the 201 sample site (CVA pipeline) has been difficult to trace due in large part to limitations of analysis and sampling conducted to date.

The events referenced above are just two examples of where water quality assessment is restricted by laboratory capabilities. More sophisticated analysis techniques are available and range from the highly sophisticated DNA analysis to individual distinctions between indicator bacteria. Information is also currently lacking on stream flow data throughout the year. Further advances in improved stream data (e.g. pollutant loadings, base flow, stormwater discharges) can help to further understand and quantify stream dynamics and water quality results.

REFERENCED FIGURES AND TABLES

QUABBIN WATERSHED

1995 SAMPLE SITES

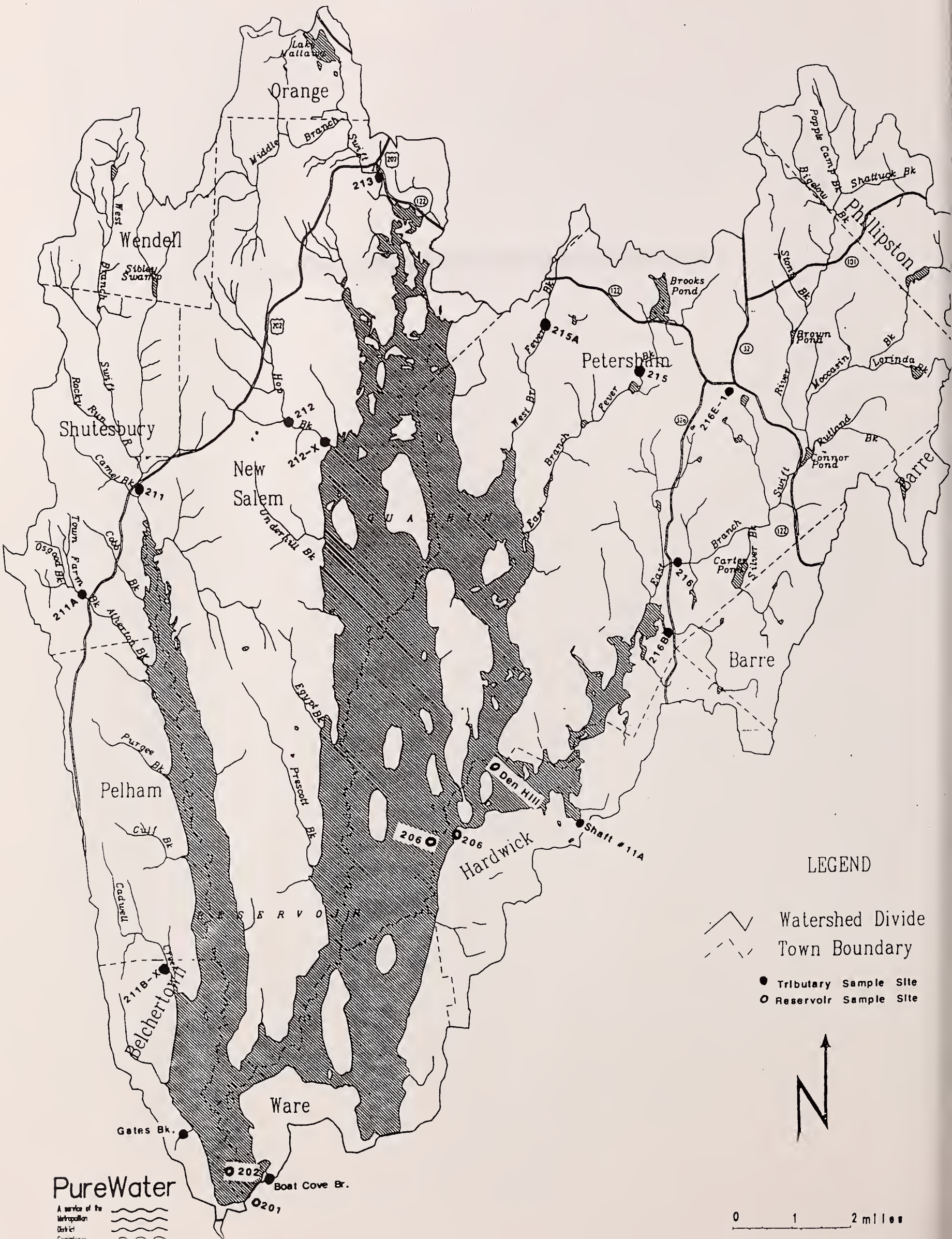


Table 1
1995 Quabbin Tributary Sampling Stations

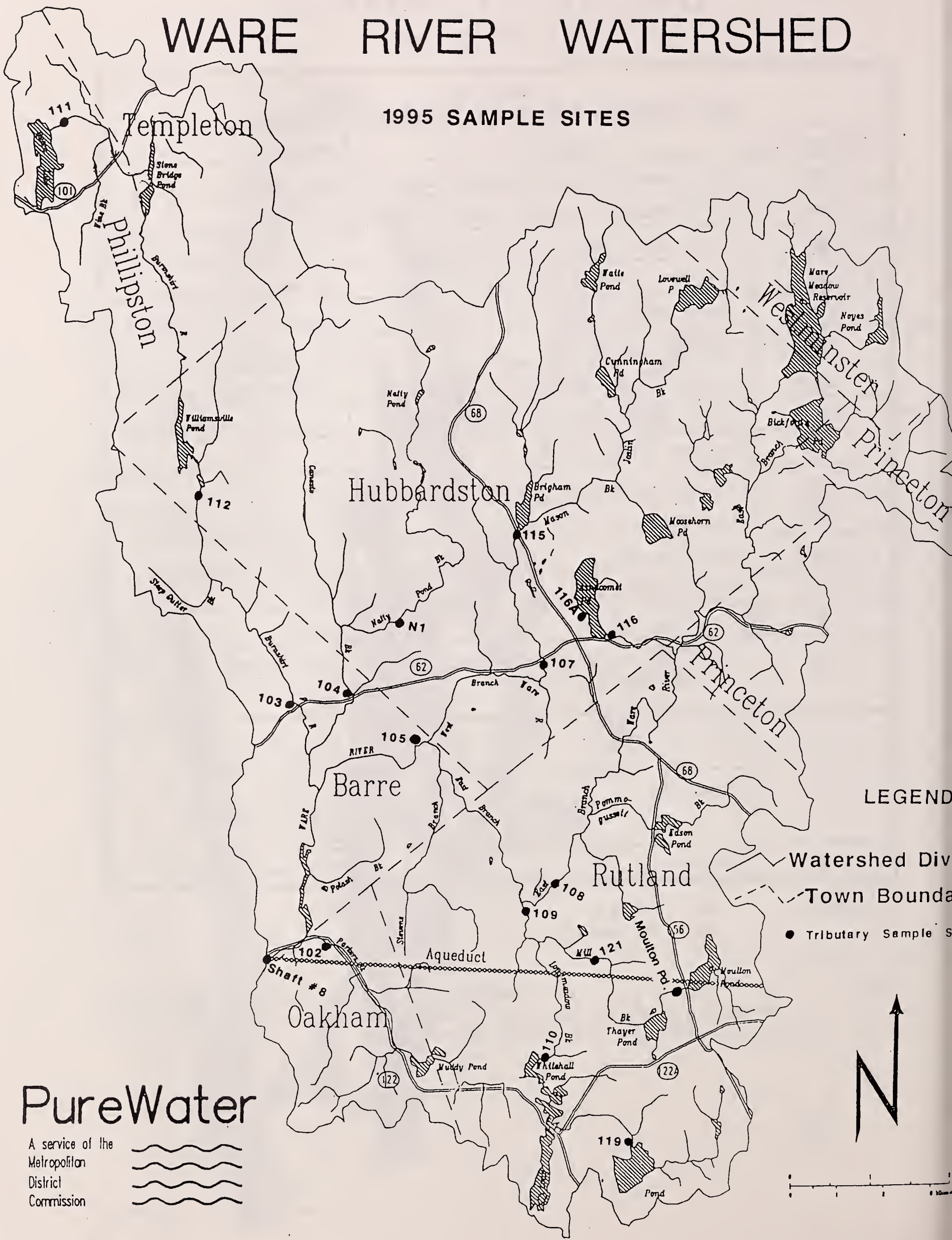
Frequency	Station	Location
BM	(211) West Branch Swift River	Rt. 202
BM	(213) Middle Branch Swift River	Gate 30
BM	(216) East Branch Swift River	Rt. 32A
BM	(211BX) Cadwell Creek	At mouth
BM	(212) Hop Brook	Gate 22
BM	(212X) Hop Brook	At mouth
BM	(215A) West Branch Fever Brook	Womens Fed. Forest
BM	(215) East Branch Fever Brook	West St. Petersham
BM	(216B) Rand Brook	Rt. 32A
BM	(211A) Atherton Brook	Rt. 202
BM	Boat Cove Tributary	Quabbin Park
BM	Gates Brook	Gate 5/mouth
W	(206) Quabbin	Shaft 12
W	(201) Quabbin	Outlet
BM	(216E-1) Petersham Brook (formerly SS# XXX)	Petersham, Rt. 122 East of Grange Hall
M	QR01/202	West Arm opposite Winsor Dam
M	QR06/206	Quabbin Lake/opposite Shaft 12
M	QR10	Off Den Hill

Frequency:
W = weekly
BM = bimonthly
M = monthly

note: QR indicates that samples are collected from the reservoir where sampling is only conducted during the months of April through November.

WARE RIVER WATERSHED

1995 SAMPLE SITES



PureWater

A service of the Metropolitan District Commission

Table 2
Ware River Watershed
1995 Tributary Sampling Stations

Frequency	Station	Location
BM	(111) Queen Lake	Road culvert
BM	(112) Burnshirt River	Williamsville
BM	Natty Pond Brook	Hale Road
BM	(104) Canesto & Natty Brooks	Rt. 62
BM	(103) Burnshirt River	Rt. 62
BM when flowing	Ware River	Shaft 11A
BM	Ware River	Shaft 8
BM	(102) Parker Brook	Near mouth
BM	(110) Long & Whitehall Pond	Outlet
BM	(107) West Branch Ware River	Rt. 62
BM 7/13 thru 8/24	Asnacomet Pond	Beach
BM	(115) Brigham Pond	Outlet
BM	(116) Asnacomet Pond	Outlet
BM	(105) Ware River	Barre falls
BM	(108) East Branch Ware River	New Boston
BM	(109) Longmeadow Brook	Near mouth
BM	(121) Mill Brook	Charnock Hill Rd
BM	Moulton Pond	Outlet
BM	(119 Demon Pond	Outlet

Frequency: W = weekly
BM = bimonthly
M = monthly

TABLE 3

METHODS USED FOR FIELD AND LABORATORY ANALYSIS
QUABBIN LABORATORY

PARAMETER	STANDARD METHOD
Turbidity	SM 2130 B
pH	SM 4500-H+ B Hydrolab Surveyor II Orion 811 meter
Alkalinity	SM 2320 B (low level)
Chloride	SM 4500-Cl C
Hardness	SM 2340 C
Color	SM 2120 B
Conductivity	HACH DREL/5 meter Hydrolab Surveyor II
Temperature	YSI Model 57 DO meter Hydrolab Surveyor II
Dissolved Oxygen	YSI Model 57 DO meter Hydrolab Surveyor II
Iron	HACH DR/3 Spectrophotometer
Total Solids	SM 2540 B
Fixed Solids	SM 2540 E
Total Coliform	SM 9222B
Fecal Coliform	SM 9222 D

SM = Standard Methods for the Examination of Water and Wastewater - 18th edition, 1992

TABLE 4
AVG CONCENTRATION VS. SURFACE WATER QUALITY STANDARDS

QUABBIN:

SAMPLE SITE	pH - Class A Std. 6.5 - 8.5	DISS. OXYGEN[1] Class A Std. 6mg/l / 75%	FECAL COLI.[2] Class A Std Mean 20/100ml
West Branch	6.15	11.1/90%	11
Middle Branch	6.18	7.70/62%	32
East Branch	6.52	10.7/90%	34
Petersham Bk	ND	----	73
Boat Cove	7.04	11.3/91%	44
Gates Brook	5.93	11.0/92%	18
Cadwell Creek	5.97	11.2/91%	19
Atherton Bk	5.93	11.3/91%	6
Hop Bk (Gate)	6.50	11.3/91%	26
Hop Bk (Mouth)	6.18	10.5/89%	32
West Branch Fvr	6.58	9.70/81%	31
East Branch Fvr	5.72	8.20/67%	19
Rand Brook	6.18	11.0/93%	18

WARE RIVER:

SAMPLE SITE	pH - Class A Std. 6.5 - 8.5	DISS. OXYGEN[1] Class A Std. 6mg/l / 75%	FECAL COLI.[2] Class A Std Mean 20/100ml
Shaft 8	6.31	10.8/92%	41
Queen Lake	6.58	10.5/89%	65
Burnshirt River	5.95	10.3/87%	10
Burnshirt @ 62	6.01	10.7/90%	22
Brigham Pond	6.01	10.3/88%	18
Comet Pond	6.18	11.0/92%	7
West Branch Ware	5.9	8.50/69%	94
EB Ware	6.18	9.30/77%	18
Barre Falls	6.18	8.70/79%	118
Can & Natty	6.27	10.9/90%	51
Longmeadow Bk	6.15	6.20/49%	75
Mill Brook	6.58	8.70/73%	60
Moulton Pond	6.41	8.60/76%	26
Long & Whitehall Pd	6.69	9.40/85%	6
Demon Pond	6.58	10.4/85%	20
Parker Brook	6.45	11.1/91%	21
Natty Pond Bk	5.85	6.70/54%	20

Notes:
1) Dissolved Oxygen shown in both mg/l and % saturation
2) Fecal coliform concentrations reported per 100 ml M.F. method

1995 PRECIPITATION TOTALS WINSOR DAM		
	'95 total	AVG Precip. 1929-1994
JANUARY	3.67"	4.06"
FEBRUARY	3.08"	2.94"
MARCH	1.81"	3.81"
APRIL	2.24"	3.85"
MAY	3.08"	4.07"
JUNE	2.41"	4.06"
JULY	3.63"	4.31"
AUGUST	4.53"	4.36"
SEPTEMBER	3.67"	4.09"
OCTOBER	11.08"	4.06"
NOVEMBER	4.10" (8.0" snow)	4.11"
DECEMBER	1.78" (19.0" snow)	3.62"
yearly totals:	44.98"	46.10"

source: Quabbin Reservoir Watershed Report - DWM

TABLE 5

TABLE 6

A study of pH and S.M. Alkalinity 1964 - 1994

Yearly Avg's for pH & Alk. Tributaries of Quabbin Res.		Group 1					Group 2					Avg. Group 1	Avg. Group 2	Avg. Group 3	Avg. Group 4
Year of sampling ---->		64	65	66	67	68	72	73	74	75	76				
211	pH	6.38	6.51	6.50	6.43	6.57	6.35	6.35	6.17	6.23	6.37	6.48	6.29	5.87	6.12
West Branch Swift River	ALK	4.04	5.56	5.03	5.65	5.38	4.39	4.51	3.93	3.87	4.82	5.13	4.30	2.89	4.03
No. of data entries for year		27	38	38	52	39	43-42	41	45	51-46	39				
213	pH	6.18	6.28	6.22	6.28	6.32	6.16	6.22	6.15	6.18	6.32	6.26	6.21	6.02	6.27
Middle Branch-Swift River	ALK	6.89	7.89	6.80	7.70	7.28	6.12	5.91	5.53	6.17	7.09	7.31	6.16	5.98	8.31
No. of data entries for year		27	38	38	52	39	43-42	41	44	51-46	39				
216	pH	6.42	6.54	6.41	6.42	6.51	6.38	6.45	6.30	6.37	6.44	6.46	6.39	6.21	6.51
East Branch - Swift River	ALK	5.30	6.54	5.70	6.60	6.35	4.90	4.68	4.04	4.41	5.49	6.10	4.70	4.10	5.34
No. of data entries for year		27	38	38	52	39	43-42	42	45	51-46	39				
212	pH	6.58	6.67	6.56	6.60	6.77	6.61	6.64	6.53	6.58	6.67	6.64	6.61	6.46	6.69
Hop Brook - gate 22 road	ALK	7.12	7.92	7.10	8.42	8.90	6.73	6.31	6.21	6.71	8.05	7.89	6.80	6.54	8.48
No. of data entries for year		20	19	26	32	20	28	16	33	29-24	22				
215	pH	5.66	5.78	5.71	5.73	5.81	5.70	5.73	5.62	5.65	5.92	5.74	5.72	5.58	5.76
East Branch - Fever Brook	ALK	3.71	3.98	3.61	4.16	4.55	3.31	3.48	2.93	2.92	4.05	4.00	3.34	2.78	3.63
No. of data entries for year		26	29	31	40	36	34	31	38	41-36	29				

Yearly Avg's for pH & Alk. Tributaries of Quabbin Res.		Group 3					Group 4				
Year of sampling ---->		80	81	82	83	84	90	91	92	93	94
211	pH	5.86	5.89	6.05	5.93	5.62	5.85	6.18	6.27	6.23	6.07
West Branch Swift River	ALK	3.31	2.96	3.01	3.20	1.95	3.00	4.35	4.20	4.70	3.91
No. of data entries for year		34	34	51-50	46	44	31	26	26	26	26
213	pH	5.91	5.96	6.19	6.05	5.99	6.20	6.31	6.41	6.31	6.13
Middle Branch-Swift River	ALK	6.09	5.44	6.29	6.33	5.76	6.50	7.86	8.49	10.00	8.72
No. of data entries for year		34-33	34	51-50	46	48	22	26	26	26	26
216	pH	6.07	6.07	6.31	6.35	6.27	6.35	6.48	6.63	6.58	6.50
East Branch - Swift River	ALK	4.68	3.83	4.03	4.15	3.81	4.41	5.17	5.81	5.94	5.35
No. of data entries for year		34-33	33	51-50	46	44	31	26	26	26	26
212	pH	6.22	6.33	6.64	6.57	6.53	6.42	6.68	6.84	6.73	6.78
Hop Brook - gate 22 road	ALK	6.36	5.98	7.00	6.72	6.63	4.73	9.98	9.32	9.68	8.70
No. of data entries for year		15-14	24	26	45	47	6	17	26	25	25
215	pH	5.57	5.56	5.65	5.61	5.53	5.68	5.79	5.90	5.75	5.68
East Branch - Fever Brook	ALK	3.19	2.92	2.66	2.68	2.47	3.32	3.60	3.81	3.80	3.62
No. of data entries for year		19-18	25	35	33	40	22	26	26	25	25

TABLE 7

1995 QUABBIN RESERVOIR FACTS

Maximum Reservoir Elevation: April 14th - 527.64 ft.
Minimum Reservoir Elevation: October 4th - 521.46 ft.

Number of Days Flows Disharged Over the Spillway: none

Ware River Diversions to Quabbin: June 5-8th, 237.3 million gallons

Average Daily Flow Entering CVA: 9.66 MGD
Average Daily Flow Entering Shaft 12: 146.4 MGD

Annual Snowfall on Quabbin Watershed (Admin. Bldg. Sampler): 39.5 inches
Annual Rainfall on Quabbin Watershed (Admin. Bldg. Sampler): 44.98 inches
Mean Rainfall Event (1990-95 Admin Bldg records): 0.40 inches

Reservoir Ice Cover:
Winsor Dam Iced Over: February 9th
Entire Reservoir Opened Up: March 18th

References

Edberg, Stephen C. Ph.D., A.B.M.M., January/February 1996, Journal of Environmental Health. Vol. 58, No. 6, "Assessing Health Risk in Drinking Water From Naturally Occurring Microbes".

Geldreich, E.E., Goodrich, J.A., and Clark, R.M., 1988. "Characterizing Raw Surface Water Amendable to Minimal Water Supply Treatment". Proceedings from the AWWA Annual Conference.

Keller, Richard L., August, 1987. Acidification and Fish Harvest Trends at Quabbin Reservoir. Massachusetts Division of Fisheries and Wildlife.

Metropolitan District Commission/Department of Environmental Protection, November 1990. Quabbin Tributaries Water Quality Data Report 1989-1990. Division of Water Pollution Control, Westborough, MA with the assistance of the Division of Watershed Management, Boston.

Metropolitan District Commission, 1988-1995. Quabbin Reservoir Watershed Report. Division of Watershed Management, Boston, MA.

Snow, Danna E., June 1994. Journal of New England Water Works Association, Reoccurring Coliform Bacterial Contamination Identification and Remedial Action

6.0 WATER QUALITY DATA

MDC QUABBIN LABORATORY REPORTING UNITS

Parameter	Unit
Depth	meters
Dissolved Oxygen	mg/l
Temperature	degrees centigrade
Specific conductance	micromhos per cm
pH	standard units
Turbidity	NTU
Standard alkalinity	mg/l as CaCo3
Hardness	mg/l as CaCo3
Alkalinity	mg/l as CaCo3
Color	color units
Fecal coliform bacteria	colonies/100 ml
Total coliform bacteria	colonies/100 ml
Nitrate-nitrogen	mg/l
Nitrite-nitrogen	mg/l
Kjeldahl-nitrogen	mg/l
Total phosphorus	mg/l
Chlorides	mg/l
Silica	mg/l
Aluminum	mg/l
Arsenic	mg/l
Copper	mg/l
Chromium	mg/l
Iron	mg/l
Lead	mg/l
Mercury	mg/l
Nickel	mg/l
Zinc	mg/l
Total organic carbon	mg/l
Oil and grease	mg/l
Volatile organics	micrograms/l
Solids	mg/l

6.1 QUABBIN RESERVOIR TRIBUTARIES

WATER QUALITY DATA

QUABBIN LABORATORY RECORDS 1995
(206) QUABBIN RESERVOIR @ SHAFT #12

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. TOTAL	COLIFORM COLONIES PER 100 ML. FECAL	M.P. ELEV. GAGE
15	01/03	0.3				6.6	4.0	2.4	12.4	92	3				40	1	0	
43	01/09	0.3				6.5	3.9	2.5	12.5	90	2				40	2	0	
69	01/17	0.4				6.5	4.2	2.6	12.5	93	3				40	5	0	
95	01/23	0.3				6.5	4.3	2.8	12.7	92	2				40	3	0	
125	01/30	0.3				6.5	4.2	2.7	15.4	108	1				40	3	0	
151	02/06	0.3				6.5	4.1	2.7	13.3	91	0				40	2	0	
172	02/13	0.3	5	7.5	7.6	6.4	3.8	2.3	13.9	95	0	26	13	0.03	40	0	0	
195	02/21	0.3				6.5	3.9	2.1	13.0	91	1				40	0	0	
212	02/27	0.3				6.6	4.1	2.8	12.4	90	2				40	0	0	
239	03/06	0.3				6.6	4.1	2.7	13.1	95	2				40	0	0	
257	03/13	0.3				6.5	3.8	2.5	12.8	98	4				40	0	0	
283	03/20	0.3				6.6	4.8	2.8	13.1	97	3				40	17	0	
295	03/27	0.3				6.6	4.4	2.9	12.2	95	5				40	3	0	
350	04/03	0.3				6.6	4.2	2.7	12.7	94	3				40	2	0	
362	04/10	0.3				6.6	4.2	2.9	12.9	99	4				40	5	0	
403	04/18	0.3				6.5	4.2	2.9	12.3	96	5				40	1	0	
443	04/24	0.3				6.6	4.3	2.8	11.0	95	9				40	2	0	
467	05/01	0.3				6.6	4.3	3.1	11.8	97	7				40	5	2	
492	05/08	0.4				6.6	4.4	2.8	11.6	98	8				40	3	0	
512	05/15	0.3				6.6	4.4	2.7	11.3	100	10				40	6	0	
571	05/22	0.3	5	6.6	9.8	6.6	4.2	2.8	10.2	96	13	30	21	0.02	40	6	0	
596	05/30	0.3				6.6	4.2	2.8	10.4	100	14				40	3	0	
618	06/05	0.3				6.7	4.3	2.7	9.8	99	16				40	18	0	
654	06/12	0.8				6.7	4.0	2.3	9.2	97	18				40	50	34	
661	06/19	0.3				6.8	4.2	2.7	8.9	99	21				40	19	2	
787	06/26	0.4				6.8	3.9	2.4	8.6	97	22				40	13	1	
801	07/05	0.3				6.6	4.2	2.5	8.4	97	23				42	13	1	
817	07/10	0.3				6.7	3.9	2.3	8.3	94	22				40	2	0	
838	07/17	0.3				6.7	3.9	2.4	8.1	93	23				40	16	3	
941	07/24	0.3				6.6	4.2	2.8	7.8	91	24				42	6	0	
968	07/31	0.3				6.7	4.3	2.9	7.8	93	25				40	5	0	
985	08/07	0.3				6.7	4.3	3.1	7.9	92	24				42	23	12	
1008	08/14	0.3	5	6.5	9.2	6.7	4.1	2.7	8.1	96	25	29	20	0.03	43	4	0	
1128	08/21	0.3				6.7	3.9	2.5	7.9	92	24				42	3	0	
1133	08/28	0.3				6.7	4.0	2.3	8.1	93	23				42	0	0	
1169	09/05	0.3				6.7	4.5	2.9	8.2	93	22				42	18	0	
1173	09/11	0.3				6.6	4.2	2.6	8.4	93	21				42	2	0	
1284	09/18	0.3				6.6	4.0	2.4	8.6	92	19				42	10	1	
1295	09/25	0.3				6.7	4.0	2.4	8.6	90	18				42	2	0	
1327	10/02	0.3				6.6	3.8	2.3	8.8	91	17				42	1	0	
1333	10/10	0.3				6.6	3.8	2.3	8.5	88	17				42	6	0	
1368	10/16	0.3				6.5	4.2	2.9	9.0	89	15				40	4	0	
1373	10/23	0.3				6.4	4.2	3.0	9.0	89	15				42	10	1	
1487	10/30	0.3				6.5	4.3	3.1	9.3	90	14				42	40	0	
1539	11/06	0.3				6.5	4.3	3.0	9.7	90	12				42	7	0	
1580	11/13	0.3				6.5	4.2	2.7	9.6	85	10				40	8	0	
1631	11/20	0.3	5	6.7	11.8	6.5	4.2	2.8	9.9	86	9	23	14	0.03	42	4	0	
1658	11/27	0.3				6.6	4.4	2.9	10.2	86	8				40	3	1	
1689	12/04	0.3				6.6	4.5	2.9	11.0	91	7				42	2	0	
1731	12/11	0.3				6.6	4.0	2.3	11.6	86	3				42	3	0	
1743	12/18	0.3				6.6	3.9	2.3	11.1	83	3				42	6	0	
1778	12/26	0.3				6.5	4.0	2.6	12.4	87	1				42	4	0	
AVG.		0.3	5	6.8	9.6	6.59	4.15	2.66	10.5	93	12	27	17	0.03	41	7	1	
MAX.		0.8	5	7.5	11.8	6.8	4.8	3.1	15.4	108	25	30	21	0.03	43	50	34	
MIN.		0.3	5	6.5	7.6	6.4	3.8	2.1	7.8	83	0	23	13	0.02	40	0	0	

QUABBIN LABORATORY RECORDS 1995
(201) QUABBIN RESERVOIR @ OUTLET BUILDING

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL	ELEV. GAGE
1	01/01																2	
2	01/02																2	
16	01/03	0.3				6.5	3.9	2.3	11.3	88	5				40	7	3	
18	01/03																2	
19	01/04															4	0	
20	01/04																1	
21	01/05															3	0	
22	01/05																0	
23	01/06																1	
24	01/07																0	
25	01/08																3	
44	01/09	0.3				6.5	3.9	2.5	11.6	89	4				40	7	4	
45	01/09																1	
46	01/10															11	0	
47	01/10																0	
48	01/11															8	1	
49	01/11																0	
50	01/12															4	0	
51	01/12																0	
52	01/13																0	
53	01/14																0	
54	01/15																0	
55	01/16																0	
70	01/17	0.3				6.5	3.9	2.5	11.8	92	5				40	4	0	
71	01/17																0	
72	01/18															5	0	
73	01/18																2	
74	01/19															7	1	
75	01/20																0	
76	01/21																0	
77	01/22																0	
96	01/23	0.3				6.5	3.8	2.5	11.7	90	4				40	1	0	
97	01/23																0	
98	01/24															5	1	
99	01/24																3	
105	01/25															9	1	
106	01/25																3	
107	01/26															2	2	
108	01/26																0	
109	01/27																1	
110	01/28																1	
111	01/29																1	
126	01/30	0.3				6.5	3.8	2.4	14.8	114	4				40	6	0	
127	01/30																0	
128	01/31															3	1	
129	01/31																1	
130	02/01															4	0	
131	02/01																0	
132	02/02															1	0	
133	02/02																0	
134	02/03																1	
135	02/05																1	
152	02/06	0.3				6.5	4.2	2.6	12.6	89	1				40	1	1	
153	02/06																0	
154	02/07															6	0	

CONTINUED

QUABBIN LABORATORY RECORDS 1995
(201) QUABBIN RESERVOIR @ OUTLET BUILDING

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
155	02/07																0
156	02/08															1	0
157	02/08																1
158	02/09															5	0
173	02/13	0.3	5	6.4	8.4	6.4	4.1	2.6	12.8	90	1	26	14	0.03	40	1	0
174	02/14															3	0
175	02/15															2	0
178	02/16															1	0
196	02/21	0.3				6.5	4.2	2.6	12.8	93	2				40	3	0
197	02/22															1	0
198	02/23															2	0
213	02/27	0.3				6.6	4.3	2.9	12.0	89	3				40	1	0
214	02/28															2	1
221	03/01															5	0
222	03/02															3	0
240	03/06	0.3				6.6	4.3	2.7	12.7	94	3				40	1	0
241	03/07															1	0
242	03/08															1	0
243	03/09															0	0
258	03/13	0.3				6.5	4.2	2.7	12.7	94	3				40	0	0
259	03/14															3	0
260	03/15															3	1
261	03/16															2	1
262	03/17															0	0
263	03/17															0	0
264	03/18																3
265	03/19																0
284	03/20	0.3				6.6	4.1	2.1	12.8	95	3				40	2	1
285	03/20																0
286	03/21															1	0
287	03/21																0
288	03/22															2	0
289	03/22																0
290	03/23															1	0
291	03/23																0
292	03/24																0
293	03/25																1
294	03/26																0
296	03/27	0.3				6.6	4.4	2.8	11.8	91	4				42	0	0
310	03/27																0
311	03/28															0	0
312	03/28																0
313	03/29															0	0
314	03/29																0
328	03/30															0	0
329	03/30																0
330	03/31																1
331	04/01																0
332	04/02																0
351	04/03	0.3				6.6	4.0	2.5	12.7	97	4				40	2	0
352	04/03																0
353	04/04															2	0
354	04/04																0
355	04/05															1	0
356	04/05																0

CONTINUED

QUABBIN LABORATORY RECORDS 1995
(201) QUABBIN RESERVOIR @ OUTLET BUILDING

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
357	04/06															0	0
358	04/06																0
359	04/07																0
360	04/08																0
361	04/09																0
363	04/10	0.3				6.6	4.1	2.6	12.8	98	4				40	0	0
377	04/10																1
379	04/11															2	1
380	04/11																0
382	04/12															1	0
383	04/12																0
384	04/13															1	0
385	04/13																0
404	04/18	0.3				6.5	4.1	2.9	12.4	97	5				40	4	0
406	04/19															3	0
407	04/20															1	0
444	04/24	0.3				6.6	4.2	2.8	11.6	96	7				42	2	1
458	04/25															3	0
465	04/26															0	0
466	04/27															9	0
468	05/01	0.3				6.5	4.2	3.0	11.8	100	8				40	3	0
486	05/02															3	0
490	05/03															1	1
491	05/04															1	0
493	05/08	0.3				6.6	4.2	2.5	11.3	98	9				40	4	0
507	05/09															1	0
510	05/10															7	0
511	05/11															0	0
513	05/15	0.3				6.6	4.2	2.6	11.4	96	8				40	1	0
531	05/16															3	0
532	05/17															2	0
570	05/18															1	0
572	05/22	0.3	5	7.0	9.8	6.6	4.0	2.2	10.4	92	10	30	22	0.02	42	1	0
586	05/23															1	0
594	05/24															0	0
595	05/25															0	0
597	05/30	0.3				6.6	3.9	2.2	11.4	101	10				40	21	6
616	05/31															6	1
617	06/01															5	4
619	06/05	0.3				6.6	3.9	2.5	11.2	99	10				40	5	0
633	06/06															4	0
635	06/07															3	0
636	06/08															3	0
655	06/12	0.3				6.7	4.0	2.7	11.1	100	11				40	3	0
656	06/13															2	0
657	06/14															5	0
662	06/19	0.3				6.6	4.2	2.8	10.6	98	12				53	1	0
676	06/20															5	0
678	06/21															1	0
769	06/22															2	0
788	06/26	0.3				6.7	3.9	2.3	11.0	102	12				40	1	0
789	06/27															9	0
799	06/28															3	0
800	06/29															5	0
802	07/05	0.3				6.6	3.8	2.5	11.1	102	12				40	11	0

CONTINUED

QUABBIN LABORATORY RECORDS 1995
(201) QUABBIN RESERVOIR @ OUTLET BUILDING

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
816	07/06															0	0
818	07/10	0.3				6.7	4.0	2.6	11.2	101	11				40	3	0
835	07/11															1	0
836	07/12															8	0
837	07/13															5	0
839	07/17	0.3				6.7	4.0	2.4	9.5	92	14				50	1	0
851	07/18															1	0
852	07/19															5	0
940	07/20															1	0
942	07/24	0.3				6.6	4.2	2.8	10.9	103	13				42	2	0
965	07/25															0	0
966	07/26															0	0
967	07/27															1	0
969	07/31	0.3				6.6	4.3	2.9	11.0	102	12				40	0	0
982	08/01															0	0
983	08/02															0	0
984	08/03															0	0
986	08/07	0.3				6.7	3.9	2.4	10.9	103	13				40	0	0
1005	08/08															0	1
1006	08/09															1	0
1007	08/10															0	0
1009	08/14	0.3	5	6.8	9.3	6.6	3.8	2.3	10.4	102	15	32	23	0.03	48	1	0
1021	08/15															0	0
1022	08/16															0	0
1111	08/17															2	0
1129	08/21	0.3				6.7	4.1	2.7	10.9	103	13				40	0	0
1130	08/22															0	0
1131	08/23															0	0
1132	08/24															0	0
1134	08/28	0.3				6.7	4.2	2.8	10.8	104	14				40	1	0
1146	08/29															0	0
1153	08/30															0	0
1154	08/31															0	0
1170	09/05	0.3				6.6	3.9	2.4	10.9	103	13				40	0	0
1171	09/06															0	0
1172	09/07															0	0
1174	09/11	0.3				6.5	3.9	2.6	9.6	102	16				40	0	0
1184	09/12															0	0
1268	09/13															0	0
1269	09/14															0	0
1285	09/18	0.3				6.5	3.9	2.4	8.9	93	18				42	2	0
1292	09/19															1	0
1293	09/20															0	0
1294	09/21															0	0
1296	09/25	0.3				6.5	4.1	2.8	9.0	93	17				42	0	0
1308	09/26															5	0
1309	09/27															0	2
1310	09/28															1	0
1328	10/02	0.3				6.5	4.2	3.0	9.1	92	16				42	3	0
1330	10/03															10	1
1331	10/04															50	0
1332	10/05															10	0
1334	10/10	0.3				6.5	4.1	2.9	9.1	92	16				43	50	0
1348	10/11															3	1
1349	10/12															9	0

CONTINUED

QUABBIN LABORATORY RECORDS 1995
(201) QUABBIN RESERVOIR @ OUTLET BUILDING

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
1369	10/16	0.3				6.3	3.6	2.6	9.0	89	15				40	30	1
1370	10/17															33	1
1371	10/18															2	0
1372	10/19															14	2
1374	10/23	0.3				6.3	3.8	2.4	9.0	89	15				42	9	0
1395	10/24															40	0
1396	10/25															9	0
1469	10/26															40	0
1488	10/30	0.3				6.4	4.0	2.6	9.0	87	14				42	16	7
1489	10/30																1
1490	10/31															19	0
1491	10/31																0
1492	11/01															7	1
1493	11/01																0
1534	11/02															18	0
1535	11/02																0
1536	11/03																0
1537	11/04																0
1538	11/05																0
1540	11/06	0.3				6.4	4.1	2.7	9.5	90	13				43	54	0
1554	11/06																0
1555	11/07															30	0
1556	11/07																0
1557	11/08															33	0
1558	11/08																1
1559	11/09																1
1560	11/10																1
1561	11/11																5
1562	11/12																8
1581	11/13	0.3				6.4	4.1	2.6	9.1	82	11				42	20	4
1582	11/13																2
1583	11/14															10	4
1584	11/14																0
1588	11/15															7	1
1589	11/15																5
1605	11/16															10	6
1606	11/16																4
1607	11/17																0
1608	11/17																1
1629	11/18																4
1630	11/19																0
1632	11/20	0.3	5	6.8	12.1	6.4	4.0	2.5	9.6	85	10	22	14	0.03	42	8	0
1646	11/20																3
1647	11/21															6	3
1648	11/21																2
1655	11/24															17	1
1656	11/25																4
1657	11/26																5
1659	11/27	0.3				6.5	4.3	2.7	9.8	87	10				40	22	4
1678	11/27																4
1679	11/28															22	3
1680	11/28																4
1681	11/29															16	2
1682	11/29																2
1683	11/30															11	1

CONTINUED

QUABBIN LABORATORY RECORDS 1995
(201) QUABBIN RESERVOIR @ OUTLET BUILDING

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
1684	11/30																0
1685	12/01																0
1686	12/01																0
1687	12/02																1
1688	12/03																1
1690	12/04	0.3				6.5	4.1	2.7	10.4	90	9				48	5	0
1704	12/04																0
1705	12/05															11	0
1706	12/05																0
1707	12/06															10	1
1708	12/06																0
1709	12/07															13	0
1710	12/07																0
1711	12/08																0
1712	12/08																0
1713	12/09																0
1714	12/10																0
1732	12/11	0.3				6.6	4.0	2.4	10.3	85	7				42	8	0
1733	12/11																0
1734	12/12															12	0
1735	12/12																0
1736	12/13															12	0
1737	12/13																0
1738	12/14															16	0
1739	12/15																0
1740	12/15																0
1741	12/16																1
1742	12/17																0
1744	12/18	0.3				6.6	3.9	2.4	10.5	84	6				42	4	0
1757	12/18																0
1758	12/19															7	0
1759	12/20															13	2
1760	12/21																1
1761	12/22																0
1779	12/26	0.3				6.5	3.9	2.6	11.3	88	5				42	4	1
1781	12/26																0
1787	12/27															5	0
1788	12/27																0
1789	12/28															1	0
1790	12/28																0
1791	12/29																0
1792	12/29																0
1793	12/30																0
1794	12/31																0
AVG.		0.3	5	6.8	9.9	6.55	4.04	2.59	11.0	95	9	28	18	0.03	41	6	1
MAX.		0.3	5	7.0	12.1	6.7	4.4	3.0	14.8	114	18	32	23	0.03	53	54	8
MIN.		0.3	5	6.4	8.4	6.3	3.6	2.1	8.9	82	1	22	14	0.02	40	0	0

QUABBIN LABORATORY RECORDS 1995
(211) WEST BR. OF SWIFT RIVER---RT.202

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL	ELEV. GAGE
3	01/03	0.3				5.9	3.1	1.5	13.4	92	0				38	40	1	
56	01/17	0.3				5.7	2.2	0.4	12.6	94	3				37	60	2	
112	01/30	0.3				6.1	4.1	2.6	14.8	101	0				43	60	0	
159	02/13	0.3	12	6.9	7.5	6.1	4.0	2.4	13.4	92	0	37	22	0.08	45	95	0	
199	02/27	0.3				6.1	2.9	1.6	13.7	94	0				42	65	0	
244	03/13	0.3				6.1	2.8	1.4	12.7	92	2				40	55	1	
297	03/27	0.3				6.2	2.9	1.5	12.4	92	3				40	80	1	
364	04/10	0.3				6.1	2.6	1.3	13.4	97	2				40	60	0	
445	04/24	0.3				6.2	2.9	1.4	11.8	92	5				40	50	2	
494	05/08	0.3				6.4	3.9	2.5	11.6	93	6				45	60	4	
573	05/22	0.3	15	9.8	9.8	6.4	4.0	2.5	9.8	89	11	36	25	0.07	43	38	25	
620	06/05	0.4				5.7	2.3	0.9	9.6	91	13				30	60	35	
663	06/19	0.3				6.6	5.0	3.4	8.8	91	17				50	120	20	
803	07/05	0.4				6.5	7.8	6.5	8.8	89	16				65	230	10	
840	07/17	0.4				6.6	8.3	6.8	8.0	82	17				72	250	40	
970	07/31	0.4				6.5	6.3	4.7	8.2	84	17				57	270	30	
1010	08/14	0.4	18	12.7	11.7	6.5	7.0	5.6	8.4	85	16	53	39	0.17	70	300	30	
1135	08/28	0.4				6.6	8.7	7.4	9.0	81	11				87	120	40	
1175	09/11	0.3				6.4	8.6	7.3	9.6	81	8				100	60	10	
1297	09/25	0.3				6.2	5.1	3.7	9.6	85	10				60	110	20	
1335	10/10	0.3				5.9	2.8	1.5	10.3	87	8				50	50	5	
1375	10/23	0.3				5.3	1.5	0.4	10.6	89	8				42	200	10	
1541	11/06	0.2				5.8	2.1	1.4	12.4	95	4				40	70	3	
1633	11/20	0.2	18	6.6	11.5	5.9	2.9	1.3	11.7	90	4	32	20	0.06	40	43	6	
1691	12/04	0.2				6.1	3.7	2.1	12.0	89	3				48	50	1	
1745	12/18	0.2				6.1	3.8	2.4	11.9	89	3				48	50	0	
AVG.		0.3	16	9.0	10.1	6.15	4.28	2.87	11.1	90	7	40	27	0.10	50	102	11	
MAX.		0.4	18	12.7	11.7	6.6	8.7	7.4	14.8	101	17	53	39	0.17	100	300	40	
MIN.		0.2	12	6.6	7.5	5.3	1.5	0.4	8.0	81	0	32	20	0.06	30	38	0	

QUABBIN LABORATORY RECORDS 1995
(213) MIDDLE BR.OF SWIFT RIVER @ GATE #30

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL	ELEV. GAGE
4	01/03	0.4				6.0	4.2	2.5	11.6	79	0				50	15	8	
57	01/17	0.4				6.0	3.9	2.4	10.9	77	1				47	36	8	
113	01/30	0.4				6.1	5.8	4.0	12.4	87	1				67	25	3	
160	02/13	0.4	20	11.8	11.6	6.1	6.6	4.6	10.3	70	0	45	30	0.13	63	36	7	
200	02/27	0.4				6.2	6.3	4.8	12.0	82	0				60	38	2	
245	03/13	0.3				6.2	4.7	3.1	11.3	82	2				52	36	7	
298	03/27	0.3				6.3	6.0	4.7	10.4	81	5				55	55	14	
365	04/10	0.4				6.2	6.6	5.2	10.8	83	4				57	29	6	
446	04/24	0.5				6.2	6.5	5.1	7.3	64	10				53	12	6	
495	05/08	0.7				6.3	9.1	7.5	7.7	70	11				70	50	18	
574	05/22	0.6	50	12.8	10.9	6.3	9.2	7.6	6.3	63	16	54	36	0.37	65	30	25	
621	06/05	0.7				5.9	7.1	5.4	3.8	39	17				47	300	110	
664	06/19	0.6				6.2	9.8	7.9	5.3	58	20				68	60	0	
804	07/05	0.7				6.2	14.6	12.7	3.3	36	20				82	210	58	
841	07/17	0.9				6.4	16.3	14.3	4.1	46	21				95	150	30	
971	07/31	1.2				6.2	16.8	14.8	2.6	29	22				88	80	30	
1011	08/14	0.8	110	18.1	14.1	6.3	13.1	11.5	4.5	49	20	79	48	1.08	85	90	10	
1136	08/28	0.6				6.4	13.2	11.4	4.3	43	16				108	180	120	
1176	09/11	0.5				6.3	14.3	12.7	5.4	51	13				113	90	60	
1298	09/25	0.7				6.2	13.7	12.0	4.7	43	12				90	270	30	
1336	10/10	0.4				5.7	6.3	4.9	4.6	42	11				70	150	60	
1376	10/23	0.5				5.6	3.6	2.0	5.5	48	9				52	350	170	
1542	11/06	0.4				5.8	3.7	2.4	10.2	78	4				55	30	7	
1634	11/20	0.3	32	8.8	13.1	6.1	3.8	2.3	10.3	77	3	38	25	0.12	52	55	5	
1692	12/04	0.3				6.1	4.8	3.1	11.0	77	1				55	40	26	
1746	12/18	0.4				6.1	6.1	4.4	10.0	68	0				60	32	6	
AVG.		0.5	53	12.9	12.4	6.13	8.31	6.67	7.7	62	9	54	35	0.43	68	94	32	
MAX.		1.2	110	18.1	14.1	6.4	16.8	14.8	12.4	87	22	79	48	1.08	113	350	170	
MIN.		0.3	20	8.8	10.9	5.6	3.6	2.0	2.6	29	0	38	25	0.12	47	12	0	

QUABBIN LABORATORY RECORDS 1995
(216) EAST BR. OF SWIFT RIVER @ RT.32A

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL	ELEV. GAGE
5	01/03	0.5				6.2	3.9	2.2	13.8	94	0				57	28	4	
58	01/17	0.4				6.2	3.3	1.6	12.7	94	3				48	55	19	2.08
114	01/30	0.4				6.3	4.1	2.8	14.4	98	0				60	40	6	
161	02/13	0.4	32	13.2	12.0	6.4	4.7	3.1	14.0	96	0	48	29	0.13	62	45	1	
201	02/27	0.4				6.4	3.9	2.3	12.8	88	0				60	21	1	
246	03/13	0.4				6.3	3.0	1.6	12.8	95	3				50	22	0	
299	03/27	0.3				6.5	3.8	2.1	11.8	92	5				53	37	0	1.40
366	04/10	0.4				6.5	4.0	2.4	13.0	97	3				57	28	0	1.29
447	04/24	0.4				6.5	4.6	3.3	10.6	94	10				52	55	2	1.36
496	05/08	0.6				6.7	5.8	4.4	10.8	95	10				58	36	7	1.07
575	05/22	0.6	50	10.8	10.8	6.7	5.9	4.4	9.5	94	15	49	30	0.30	55	31	4	1.10
622	06/05	0.9				6.4	4.7	2.7	9.0	93	17				45	250	80	1.95
665	06/19	0.5				6.8	6.0	4.3	8.2	89	20				60	90	30	0.88
805	07/05	0.5				6.8	7.8	5.8	9.0	96	19				72	120	55	0.60
842	07/17	0.5				7.0	8.8	7.2	8.4	90	19				72	160	50	0.54
972	07/31	0.6				7.0	10.0	8.5	8.4	92	20				70	200	90	0.55
1012	08/14	0.5	40	13.6	12.8	7.0	8.4	6.9	8.0	87	20	55	36	0.32	72	250	120	0.52
1137	08/28	0.3				7.0	9.1	7.6	9.6	95	15				72	210	50	0.46
1177	09/11	0.3				6.8	9.1	7.7	9.3	82	10				72	80	20	0.40
1299	09/25	0.4				6.8	8.1	6.7	10.2	92	11				73	150	10	0.59
1337	10/10	0.4				6.4	5.3	4.0	10.6	94	10				78	200	25	0.86
1377	10/23	0.5				5.9	3.1	1.8	10.2	90	10				67	450	300	1.86
1543	11/06	0.4				6.0	3.0	1.9	12.6	98	5				62	19	4	1.50
1635	11/20	0.3	43	9.2	14.1	6.1	3.4	1.7	12.2	91	3	44	24	0.13	55	60	9	1.84
1693	12/04	0.3				6.4	3.9	2.5	12.0	87	2				55	7	4	1.36
1747	12/18	0.3				6.3	4.0	2.7	12.1	83	0				63	45	4	
AVG.		0.4	41	11.7	12.4	6.52	5.45	3.93	11.0	92	9	49	30	0.22	62	103	34	
MAX.		0.9	50	13.6	14.1	7.0	10.0	8.5	14.4	98	20	55	36	0.32	78	450	300	
MIN.		0.3	32	9.2	10.8	5.9	3.0	1.6	8.0	82	0	44	24	0.13	45	7	0	

QUABBIN LABORATORY RECORDS 1995
(216E-1) SMALL TRIB. ON RT. 122 E. OF GRANGE

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. TOTAL	COLIFORM COLONIES PER 100 ML. FECAL	M.F. ELEV. GAGE
13	01/03															TNTC	36	
66	01/17															TNTC	130	
122	01/30															200	18	
169	02/13															150	8	
209	02/27															1000	20	
254	03/13															TNTC	32	
300	03/27															TNTC	30	
367	04/10															TNTC	90	
448	04/24															TNTC	86	
497	05/08															400	10	
576	05/22															300	9	
623	06/05															TNTC	500	
666	06/19															140	40	
806	07/05															400	120	
973	07/31															1000	160	
1338	10/10															350	70	
1378	10/23															400	100	
1544	11/06															90	37	
1636	11/20															60	12	
1694	12/04															31	22	
1748	12/18															32	6	
AVG.																	73	
MAX.																	500	
MIN.																	6	

BOAT COVE BROOK - NEAR MOUTH

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. TOTAL	COLIFORM COLONIES PER 100 ML. FECAL	M.F. ELEV. GAGE
14	01/03	1.5				6.8	11.6	9.9	13.6	93	0				57	28	3	
68	01/17	1.5				6.8	11.2	9.7	11.8	91	4				52	20	4	
124	01/30	0.6				6.8	14.2	12.5	13.0	89	0				63	15	0	
171	02/13	0.6	15	4.9	11.0	6.9	16.0	14.4	13.4	92	0	58	40	0.13	68	34	1	
211	02/27	0.8				7.0	16.5	14.7	13.7	94	0				68	8	5	
256	03/13	1.0				6.9	12.6	10.8	12.9	93	2				53	14	1	
301	03/27	0.4				7.2	16.0	14.4	12.0	92	4				67	80	0	
368	04/10	0.4				7.3	16.9	15.3	13.0	94	2				68	50	3	
449	04/24	0.4				7.2	19.3	18.0	11.8	92	5				70	35	2	
498	05/08	0.3				7.4	23.8	21.8	11.2	90	6				78	50	0	
577	05/22	0.4	30	4.9	21.3	7.4	26.7	24.9	8.3	78	13	66	43	0.13	78	12	0	
624	06/05	0.7				7.2	23.6	22.0	9.0	87	14				70	500	70	
667	06/19	0.5				7.5	33.5	31.8	8.3	87	18				90	40	0	
807	07/05	0.4				7.3	35.3	33.3	7.9	79	16				98	130	25	
1339	10/10	0.3				6.8	12.1	10.6	9.2	81	10				102	1,000	600	
1350	10/12															280	53	
1379	10/23	0.4				6.7	12.6	11.1	9.8	87	10				73	200	50	
1545	11/06	0.4				6.8	12.8	11.4	11.6	91	5				70	70	16	
1637	11/20	0.7	40	5.8	19.4	6.8	10.9	9.5	12.0	92	4	54	33	0.12	60	55	31	
1695	12/04	0.4				6.9	11.7	10.3	11.6	89	4				63	51	32	
1749	12/18	0.5				7.0	13.2	11.6	12.6	86	0				68	60	37	
AVG.		0.6	28	5.2	17.2	7.04	17.53	15.90	11.3	89	6	59	39	0.13	71	130	44	
MAX.		1.5	40	5.8	21.3	7.5	35.3	33.3	13.7	94	18	66	43	0.13	102	1,000	600	
MIN.		0.3	15	4.9	11.0	6.7	10.9	9.5	7.9	78	0	54	33	0.12	52	8	0	

QUABBIN LABORATORY RECORDS 1995
GATES BROOK @ MOUTH

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL	ELEV. GAGE
67	01/17	0.3				5.1	1.3	-0.1	11.9	96	6				28	21	0	
123	01/30	0.3				5.3	1.6	0.2	14.0	98	1				28	45	0	
170	02/13	0.3	10	4.8	6.3	5.4	1.6	-0.1	13.9	95	0	30	20	0.03	28	65	0	
210	02/27	0.3				5.4	1.8	0.3	13.7	94	0				28	60	0	
255	03/13	0.2				5.1	1.0	-0.3	12.8	95	3				28	18	0	
302	03/27	0.2				5.5	2.0	0.5	12.4	92	3				28	65	0	
369	04/10	0.3				5.5	1.9	0.4	13.4	97	2				28	30	0	
450	04/24	0.2				5.5	1.5	0.0	11.0	88	6				28	45	0	
499	05/08	0.2				5.5	1.7	0.3	11.9	96	6				28	50	0	
578	05/22	0.2	13	4.3	7.9	5.9	2.0	0.6	10.4	94	11	32	24	0.03	28	35	0	
625	06/05	0.3				5.8	2.2	0.8	10.2	94	12				27	150	10	
668	06/19	0.2				6.1	2.2	0.8	8.9	90	16				30	200	10	
808	07/05	0.2				5.8	2.5	1.2	9.2	91	15				32	200	14	
843	07/17	0.3				6.2	3.0	1.7	8.2	86	18				32	130	20	
974	07/31	0.3				6.1	2.8	1.5	8.6	89	17				30	250	10	
1013	08/14	0.3	17	4.0	8.7	6.3	3.3	1.9	8.4	87	17	38	28	0.07	32	120	10	
1138	08/28	0.3				6.3	3.0	1.7	8.7	84	14				30	230	10	
1300	09/25	0.2				6.1	2.8	1.3	9.8	89	11				38	180	110	
1340	10/10	0.2				5.9	2.2	0.9	10.4	92	10				42	250	50	
1380	10/23	0.2				5.1	1.1	-0.1	10.6	94	10				33	140	10	
1546	11/06	0.2				5.0	1.0	-0.2	12.2	98	6				32	50	0	
1638	11/20	0.2	13	5.7	10.3	5.1	1.4	0.1	11.6	93	6	26	15	0.03	32	46	1	
1696	12/04	0.2				5.4	1.8	0.3	11.8	92	5				32	45	0	
AVG.		0.2	13	4.7	8.3	5.63	1.99	0.60	11.0	92	8	32	22	0.04	31	105	11	
MAX.		0.3	17	5.7	10.3	6.3	3.3	1.9	14.0	98	18	38	28	0.07	42	250	110	
MIN.		0.2	10	4.0	6.3	5.0	1.0	-0.3	8.2	84	0	26	15	0.03	27	18	0	

QUABBIN LABORATORY RECORDS 1995
(211B-X) CADWELL BROOK @ MOUTH

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL	ELEV. GAGE
6	01/03	0.3				5.4	1.5	0.0	12.8	88	0				35	31	2	5.38
59	01/17	0.3				5.3	1.7	0.1	12.0	96	6				38	35	9	5.56
115	01/30	0.4				5.5	2.1	0.6	13.8	94	0				38	50	0	4.92
162	02/13	0.3	7	6.0	6.7	5.8	2.7	1.1	14.0	96	0	33	21	0.06	37	30	0	
202	02/27	0.3				5.6	2.1	0.7	13.6	93	0				38	31	1	
247	03/13	0.3				5.4	1.9	0.4	12.6	91	2				33	40	1	4.89
303	03/27	0.3				5.8	2.0	0.7	12.2	91	3				33	45	0	
370	04/10	0.3				5.9	2.1	0.9	13.5	98	2				33	30	3	4.84
451	04/24	0.3				5.9	2.2	1.0	11.6	93	6				38	40	5	4.88
500	05/08	0.3				6.2	2.6	1.0	11.9	96	6				35	60	5	4.60
579	05/22	0.3	18	6.2	8.0	6.3	3.3	1.6	9.9	87	10	38	28	0.08	38	26	1	4.62
626	06/05	0.4				6.1	2.4	0.8	10.0	94	13				45	200	35	4.99
669	06/19	0.3				6.5	4.7	3.3	8.5	86	16				42	100	20	4.27
809	07/05	0.3				6.4	4.8	3.2	9.1	90	15				40	120	50	4.16
844	07/17	0.3				6.5	5.8	4.2	8.3	85	17				40	280	30	4.08
975	07/31	0.3				6.5	6.2	4.8	8.7	88	16				38	200	10	4.08
1014	08/14	0.2	15	5.4	8.7	6.6	6.6	5.3	8.0	80	16	41	31	0.06	40	270	40	4.00
1139	08/28	0.2				6.8	7.5	6.2	9.3	88	13				38	250	60	4.02
1178	09/11	0.2				6.6	7.7	6.3	10.4	90	9				38	150	60	3.93
1301	09/25	0.2				6.5	4.9	3.6	10.1	89	10				50	130	20	4.14
1341	10/10	0.2				6.1	2.8	1.6	10.8	93	9				50	400	120	4.38
1381	10/23	0.2				5.3	1.5	0.4	10.8	93	9				45	110	10	5.19
1547	11/06	0.2				5.3	1.4	0.4	12.0	94	5				40	60	0	5.13
1639	11/20	0.2	15	8.2	9.0	5.4	1.6	0.1	12.0	94	5	30	19	0.05	38	40	3	5.35
1697	12/04	0.2				5.7	2.1	0.8	12.2	91	3				38	19	1	
1750	12/18	0.2				5.9	2.2	1.0	12.2	83	0				38	26	1	4.83
AVG.		0.3	14	6.5	8.1	5.97	3.32	1.93	11.2	91	7	36	25	0.06	39	107	19	
MAX.		0.4	18	8.2	9.0	6.8	7.7	6.3	14.0	98	17	41	31	0.08	50	400	120	
MIN.		0.2	7	5.4	6.7	5.3	1.4	0.0	8.0	80	0	30	19	0.05	33	19	0	

QUABBIN LABORATORY RECORDS 1995
(211A) ATHERTON BROOK AT RT. #202

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL	ELEV. GAGE
12	01/03	0.3				5.5	2.0	0.3	13.6	93	0				37	13	0	
65	01/17	0.3				5.3	1.8	0.4	12.1	95	5				38	60	1	
121	01/30	0.2				5.7	1.9	0.2	15.0	103	0				35	55	0	
168	02/13	0.2	12	7.1	8.1	6.0	2.6	1.2	13.6	93	0	34	23	0.04	37	50	0	
208	02/27	0.2				5.8	2.0	0.5	13.2	90	0				38	44	0	
253	03/13	0.2				5.5	1.8	0.4	12.8	93	2				35	30	0	
304	03/27	0.2				5.9	2.0	0.5	12.3	92	3				37	80	0	
371	04/10	0.2				5.9	2.3	0.8	13.6	96	1				40	55	0	
452	04/24	0.2				5.9	2.0	0.8	12.0	94	5				38	60	0	
501	05/08	0.2				6.2	3.3	1.8	11.9	96	6				35	50	0	
580	05/22	0.2	25	6.8	5.0	6.2	3.0	1.7	10.4	94	11	36	26	0.05	37	50	1	
627	06/05	0.3				5.8	2.6	1.0	10.1	93	12				32	150	20	
670	06/19	0.3				6.3	3.5	1.9	8.9	90	16				35	150	0	
810	07/05	0.3				6.4	5.2	3.7	9.0	89	15				33	100	10	
845	07/17	0.3				6.6	5.5	4.1	8.3	85	17				33	50	0	
976	07/31	0.3				6.5	5.5	4.0	8.4	85	16				33	300	50	
1015	08/14	0.3	40	4.9	7.9	6.5	5.1	4.0	9.0	91	16	42	30	0.12	37	100	10	
1140	08/28	0.3				6.7	6.2	4.7	9.3	86	12				35	150	0	
1302	09/25	0.2				6.5	5.4	4.2	10.2	88	9				42	100	40	
1342	10/10	0.2				5.9	2.5	1.4	10.8	91	8				48	50	2	
1382	10/23	0.2				5.0	0.8	-0.4	10.5	91	9				45	240	10	
1548	11/06	0.2				5.2	0.9	-0.1	12.0	94	5				40	40	0	
1640	11/20	0.2	23	9.0	8.7	5.4	2.0	0.4	11.8	92	5	33	20	0.05	40	35	1	
1698	12/04	0.2				5.7	1.8	0.5	12.4	92	3				40	30	0	
1751	12/18	0.2				5.9	2.1	0.7	12.0	82	0				40	28	1	
AVG.		0.2	25	7.0	7.4	5.93	2.95	1.55	11.3	91	7	36	25	0.07	38	83	6	
MAX.		0.3	40	9.0	8.7	6.7	6.2	4.7	15.0	103	17	42	30	0.12	48	300	50	
MIN.		0.2	12	4.9	5.0	5.0	0.8	-0.4	8.3	82	0	33	20	0.04	32	13	0	

QUABBIN LABORATORY RECORDS 1995
(212) HOP BROOK-GATE #22

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL	ELEV. GAGE
7	01/03	0.4				6.5	5.8	4.3	13.6	93	0				70	26	5	
60	01/17	0.5				6.5	5.4	3.8	12.1	93	4				63	27	7	
116	01/30	0.4				6.6	5.9	4.2	13.6	93	0				68	40	4	
163	02/13	0.4	10	11.0	13.3	6.6	6.7	4.8	14.0	96	0	48	35	0.09	67	100	0	
203	02/27	0.3				6.7	6.6	4.9	13.3	91	0				78	100	2	
248	03/13	0.3				6.6	5.1	3.5	12.8	93	2				70	33	2	
305	03/27	0.3				6.7	6.5	5.1	12.6	94	3				67	75	0	
372	04/10	0.4				6.7	6.2	4.9	13.7	96	1				67	25	4	
453	04/24	0.3				6.8	6.9	5.7	12.0	94	5				65	19	3	
502	05/08	0.4				6.8	8.2	6.7	11.8	95	6				68	29	22	
581	05/22	0.5	25	11.8	12.0	6.9	8.9	7.5	10.4	96	12	56	44	0.18	68	60	45	
628	06/05	0.6				6.7	7.5	5.8	10.2	94	12				62	180	60	
671	06/19	0.6				6.9	11.1	9.5	8.8	91	17				78	240	60	
811	07/05	0.7				6.6	13.0	11.3	7.1	73	17				80	200	50	
846	07/17	1.3				6.6	15.4	14.0	5.6	61	20				82	210	80	
977	07/31	1.5				6.5	15.2	13.4	5.2	57	20				83	200	70	
1016	08/14	1.5	47	15.2	17.1	6.7	15.1	13.5	6.4	67	18	70	49	0.80	88	400	110	
1141	08/28	1.2				6.7	16.4	14.6	4.6	46	16				72	250	10	
1179	09/11	1.5				6.5	19.5	18.0	4.9	46	13				70	80	10	
1303	09/25	0.8				6.4	9.5	8.1	8.0	72	11				108	240	20	
1343	10/10	0.5				6.4	7.7	6.4	10.4	90	9				107	150	11	
1383	10/23	0.3				6.2	5.0	3.7	10.6	89	8				75	140	50	
1549	11/06	0.3				6.3	4.6	3.4	12.6	97	4				63	150	32	
1641	11/20	0.3	20	11.6	13.6	6.4	4.4	2.9	11.9	91	4	44	32	0.06	60	50	5	
1699	12/04	0.3				6.6	5.9	4.6	12.4	92	3				65	31	12	
1752	12/18	0.3				6.6	6.2	5.0	12.0	82	0				70	10	4	
AVG.		0.6	26	12.4	14.0	6.60	8.80	7.29	10.4	84	8	55	40	0.28	74	118	26	
MAX.		1.5	47	15.2	17.1	6.9	19.5	18.0	14.0	97	20	70	49	0.80	108	400	110	
MIN.		0.3	10	11.0	12.0	6.2	4.4	2.9	4.6	46	0	44	32	0.06	60	10	0	

QUABBIN LABORATORY RECORDS 1995
(212-X) HOP BROOK @ MOUTH

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. TOTAL	COLIFORM COLONIES PER 100 ML. FECAL	M.F. ELEV. GAGE
8	01/03	0.3				6.6	5.2	3.4	14.0	96	0				65	19	0	
61	01/17	0.4				6.6	5.3	3.7	12.2	94	4				60	45	4	
117	01/30	0.3				6.7	5.9	4.4	15.4	105	0				63	44	1	
164	02/13	0.3	10	11.0	12.0	6.8	6.8	5.0	14.0	96	0			0.08	60	80	1	
204	02/27	0.3				6.8	6.7	5.3	13.8	94	0				68	28	3	
249	03/13	0.3				6.7	5.6	4.2	13.0	94	2				65	23	0	
306	03/27	0.3				6.8	6.7	5.3	12.6	94	3				62	80	4	
373	04/10	0.4				6.8	6.6	5.3	13.9	98	1				62	12	2	
454	04/24	0.3				6.9	7.1	5.9	12.2	95	5				60	3	0	
503	05/08	0.4				7.0	8.2	6.6	11.9	96	6				62	24	19	
582	05/22	0.4	22	10.3	11.0	7.1	9.0	7.6	10.4	94	11	53	39	0.16	62	22	7	
629	06/05	0.6				6.9	7.3	5.7	10.2	94	12				58	150	55	
672	06/19	0.4				7.1	10.9	9.5	9.0	91	16				72	80	10	
812	07/05	0.3				6.9	12.0	10.7	9.2	93	16				72	110	12	
847	07/17	0.4				7.1	13.4	11.9	8.1	85	18				72	130	20	
978	07/31	0.4				7.1	13.9	12.5	8.8	91	17				78	150	10	
1017	08/14	0.4	20	11.0	16.8	7.1	13.3	12.0	9.0	91	16	58	43	0.17	78	200	10	
1142	08/28	0.3				7.2	14.3	12.9	9.5	90	13				63	200	20	
1180	09/11	0.2				7.0	14.2	12.7	10.2	90	10				60	70	10	
1304	09/25	0.3				6.9	9.7	8.4	10.4	92	10				100	140	20	
1344	10/10	0.3				6.8	7.7	6.3	11.2	95	8				100	1,000	600	
1351	10/12															250	13	
1384	10/23	0.3				6.4	4.6	3.5	11.0	93	8				72	110	10	
1550	11/06	0.3				6.5	4.4	3.4	12.8	98	4				62	29	7	
1642	11/20	0.2	18	11.0	14.3	6.5	5.0	3.7	12.0	92	4	44	30	0.06	58	32	11	
1700	12/04	0.3				6.7	5.5	4.1	12.8	93	2				62	28	6	
1753	12/18	0.2				6.7	6.2	4.8	12.3	84	0				67	25	4	
AVG.		0.3	18	10.8	13.5	6.83	8.29	6.88	11.5	93	7	52	37	0.12	68	114	32	
MAX.		0.6	22	11.0	16.8	7.2	14.3	12.9	15.4	105	18	58	43	0.17	100	1,000	600	
MIN.		0.2	10	10.3	11.0	6.4	4.4	3.4	8.1	84	0	44	30	0.06	58	3	0	

QUABBIN LABORATORY RECORDS 1995
(215A) WEST BR. OF FEVER BROOK--WOMENS FED.

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL	ELEV. GAGE
10	01/03	0.5				5.8	3.0	1.2	13.4	92	0				58	21	0	
63	01/17	0.4				5.8	2.9	1.1	12.4	90	2				50	50	4	
119	01/30	0.4				5.9	3.3	2.0	13.8	97	1				67	50	0	
166	02/13	0.4	47	16.9	9.9	6.1	4.5	2.7	12.4	85	0	57	36	0.18	70	40	1	
206	02/27	0.4				6.1	4.0	2.6	12.6	86	0				65	60	0	
251	03/13	0.3				5.9	3.1	1.7	12.3	89	2				55	37	0	
307	03/27	0.4				6.1	3.0	1.5	11.1	87	5				58	70	0	
374	04/10	0.5				6.2	3.7	2.1	11.9	93	5				60	40	0	
455	04/24	0.4				6.2	3.5	2.2	9.8	87	10				62	50	3	
504	05/08	0.6				6.3	4.3	2.7	9.6	87	11				62	29	24	
583	05/22	0.7	60	17.0	6.8	6.4	5.7	4.2	8.2	84	17	58	38	0.33	63	19	3	
630	06/05	0.7				6.0	4.3	2.6	7.6	80	18				63	200	75	
673	06/19	0.6				6.2	6.0	4.2	6.4	72	22				68	120	20	
813	07/05	0.6				6.2	7.6	6.3	6.2	68	20				72	170	28	
848	07/17	0.7				6.3	7.1	5.5	6.1	68	21				72	250	50	
979	07/31	0.8				6.3	9.2	7.8	5.2	57	20				72	400	200	
1018	08/14	0.8	50	14.2	13.0	6.5	8.5	7.2	6.6	69	18	59	35	0.40	72	270	150	
1143	08/28	0.7				6.5	8.4	7.1	7.2	69	14				70	220	90	
1181	09/11	0.7				6.4	9.4	7.9	7.8	69	10				72	190	30	
1305	09/25	0.6				6.4	8.4	7.0	8.1	75	12				72	150	90	
1345	10/10	0.5				5.8	4.2	3.1	10.0	90	11				80	80	27	
1385	10/23	0.4				5.5	3.3	1.9	9.0	81	11				80	200	10	
1551	11/06	0.4				5.4	2.2	0.9	12.0	94	5				73	90	4	
1643	11/20	0.3	55	12.6	13.7	5.7	2.3	0.7	11.9	89	3	56	33	0.16	60	60	5	
1701	12/04	0.3				5.9	2.8	1.5	11.2	81	2				65	50	0	
1754	12/18	0.4				5.9	3.4	2.0	10.6	73	0				70	43	1	
AVG.		0.5	53	15.2	10.9	6.07	4.93	3.45	9.7	81	9	58	36	0.27	67	114	31	
MAX.		0.8	60	17.0	13.7	6.5	9.4	7.9	13.8	97	22	59	38	0.40	80	400	200	
MIN.		0.3	47	12.6	6.8	5.4	2.2	0.7	5.2	57	0	56	33	0.16	50	19	0	

QUABBIN LABORATORY RECORDS 1995
(215) EAST BR. OF FEVER BROOK--ON WEST RD.

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL	ELEV. GAGE
9	01/03	0.4				5.4	2.2	0.7	12.2	86	1				68	35	0	2.60
62	01/17	0.4				5.5	2.2	0.8	11.8	88	3				60	50	2	2.77
118	01/30	0.4				5.6	2.6	1.0	14.4	104	2				73	55	0	
165	02/13	0.4	47	20.5	11.4	5.7	3.2	1.7	12.0	82	0	62	45	0.22	87	80	0	
205	02/27	0.4				5.7	2.8	1.0	12.2	86	1				78	60	0	
250	03/13	0.3				5.6	2.0	0.3	11.5	88	4				53	40	1	
308	03/27	0.4				5.8	2.8	1.3	10.8	89	7				65	120	0	2.18
375	04/10	0.4				5.8	2.9	1.7	10.7	84	5				75	100	1	2.23
456	04/24	0.4				5.8	2.9	1.5	9.6	85	10				70	50	1	2.38
505	05/08	0.6				5.8	3.2	1.7	9.3	84	11				73	100	2	2.52
584	05/22	0.6	55	17.1	10.2	5.9	3.2	1.5	6.5	67	17	58	37	0.42	70	9	1	2.60
631	06/05	0.7				5.7	3.5	1.8	6.6	71	19				70	130	55	2.98
674	06/19	1.0				5.9	5.8	4.0	3.5	40	22				80	LA	LA	2.70
814	07/05	1.3				6.0	9.5	8.1	2.9	30	17				87	120	80	2.73
849	07/17	1.5				6.0	8.5	6.8	3.3	36	20				80	60	10	2.90
980	07/31	1.5				6.0	8.7	7.2	2.7	29	19				80	70	10	2.96
1019	08/14	1.3	95	19.0	12.8	6.0	7.4	6.1	3.1	33	19	69	41	1.40	78	200	30	
1144	08/28	1.0				6.1	7.9	6.5	4.3	42	15				68	300	120	3.00
1182	09/11	1.0				6.0	8.3	6.8	4.7	42	11				70	120	10	2.80
1306	09/25	0.9				5.8	6.6	5.1	5.1	45	10				78	140	50	2.96
1346	10/10	0.8				5.6	5.7	4.3	4.2	37	10				120	120	23	2.90
1386	10/23	0.5				5.3	2.2	0.7	7.5	68	11				120	300	70	
1552	11/06	0.3				5.2	1.6	0.6	11.4	87	4				77	40	1	
1644	11/20	0.3	48	14.7	11.7	5.5	2.5	0.9	11.1	83	3	56	31	0.13	67	70	2	
1702	12/04	0.3				5.5	2.4	0.8	11.0	82	3				73	50	2	
1755	12/18	0.4				5.6	3.3	1.8	9.8	67	0				83	60	0	
AVG.		0.7	61	17.8	11.5	5.72	4.38	2.87	8.2	67	9	61	39	0.54	77	99	19	
MAX.		1.5	95	20.5	12.8	6.1	9.5	8.1	14.4	104	22	69	45	1.40	120	300	120	
MIN.		0.3	47	14.7	10.2	5.2	1.6	0.3	2.7	29	0	56	31	0.13	53	9	0	

When figuring yearly totals, Bacteria listed as LA (lab accident) was left off.

QUABBIN LABORATORY RECORDS 1995
(216B) RAND BROOK--RT.32A

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL	ELEV. GAGE
11	01/03	0.5				6.6	6.3	4.7	13.4	92	0				48	50	2	
64	01/17	0.5				6.6	5.4	3.9	12.4	95	4				42	130	60	
120	01/30	0.6				6.6	6.8	5.3	15.0	103	0				50	150	8	
167	02/13	0.5	45	9.7	12.0	6.8	8.3	6.4	14.2	97	0	49	31	0.27	57	90	16	
207	02/27	0.5				6.8	7.9	6.5	13.0	89	0				53	150	3	
252	03/13	0.5				6.6	5.2	3.6	12.4	95	4				40	50	1	
309	03/27	0.5				6.8	6.1	4.5	11.5	90	5				47	125	6	
376	04/10	0.6				6.7	6.2	4.8	13.2	98	3				48	90	4	
457	04/24	0.5				6.9	6.9	5.4	11.0	93	8				50	55	2	
506	05/08	0.7				7.0	8.4	6.8	11.0	97	10				50	40	15	
585	05/22	0.8	48	6.1	14.6	7.0	9.8	8.1	9.7	96	15	49	31	0.43	53	55	18	
632	06/05	1.0				6.9	8.6	6.8	9.4	97	17				43	250	60	
675	06/19	1.0				7.0	10.3	8.6	8.1	88	20				55	70	10	
815	07/05	1.5				7.0	13.2	11.4	8.5	91	19				63	170	19	
850	07/17	1.8				7.2	15.5	14.0	7.8	85	20				68	70	10	
981	07/31	1.3				7.1	15.7	14.3	8.2	91	21				70	90	40	
1020	08/14	1.0	50	10.5	15.8	7.2	14.7	13.2	7.8	85	20	57	37	0.62	70	200	10	
1145	08/28	1.0				7.2	14.7	13.5	9.1	90	15				72	130	60	
1183	09/11	0.9				7.1	15.9	14.6	10.2	92	11				77	80	0	
1307	09/25	1.2				7.0	12.3	10.9	10.0	92	12				70	400	40	
1347	10/10	1.0				6.8	10.8	9.6	10.8	95	10				62	150	17	
1387	10/23	0.6				6.5	7.1	5.9	10.6	94	10				68	350	20	
1553	11/06	0.5				6.4	5.9	4.6	12.4	97	5				62	180	3	
1645	11/20	0.4	50	9.3	14.3	6.4	5.2	3.7	12.4	95	4	51	27	0.18	52	100	11	
1703	12/04	0.5				6.7	6.0	4.7	12.8	95	3				57	120	3	
1756	12/18	0.4				6.7	6.9	5.4	12.2	83	0				62	100	2	
AVG.		0.8	48	8.9	14.2	6.83	9.23	7.74	11.0	93	9	52	32	0.38	57	133	17	
MAX.		1.8	50	10.5	15.8	7.2	15.9	14.6	15.0	103	21	57	37	0.62	77	400	60	
MIN.		0.4	45	6.1	12.0	6.4	5.2	3.6	7.8	83	0	49	27	0.18	40	40	0	

6.2 WARE RIVER TRIBUTARIES

WATER QUALITY DATA

QUABBIN LABORATORY RECORDS 1995
WARE RIVER AND TRIBUTARIES
WARE RIVER--@ SHAFT #8

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
35	01/09	0.5				5.9	3.0	1.4	14.0	96	0				55	31	0
87	01/23	0.4				5.9	2.7	1.0	13.3	96	2				50	23	2
144	02/06	0.4				6.2	3.9	2.5	12.9	88	0				60	8	3
187	02/21	0.4	42	12.5	12.0	6.3	4.6	3.1	12.6	86	0	54	42	0.20	62	21	0
231	03/06	0.4				6.3	4.5	2.9	13.9	95	0				68	45	0
275	03/20	0.5				6.3	3.9	2.2	12.6	98	5				52	24	0
333	04/03	0.4				6.4	4.4	2.9	12.4	97	5				60	12	1
386	04/18	0.5				6.3	3.5	2.2	11.4	96	8				60	10	0
469	05/01	0.9				6.4	4.3	2.9	11.0	99	11				62	9	3
514	05/15	1.2	65	11.5	9.5	6.4	4.7	3.0	9.2	89	14	52	32	0.52	60	16	8
598	05/30	1.5				6.5	6.0	4.3	9.9	100	16				62	150	110
637	06/12	1.7				6.5	6.7	5.1	9.5	98	17				60	220	70
770	06/26	2.2				6.6	8.0	6.4	8.3	94	22				70	80	10
819	07/10	2.0				6.7	8.0	6.6	8.6	95	21				72	100	50
943	07/24	2.0				6.7	7.6	6.0	7.6	87	23				80	300	140
987	08/07	2.5				6.6	8.1	6.3	8.1	88	20				68	170	100
1112	08/21	2.3	65	17.9	14.2	6.7	8.0	6.4	8.0	89	21	66	42	1.00	80	80	20
1156	09/05	1.8				6.7	8.1	6.5	8.6	90	18				82	120	10
1270	09/18	2.3				6.6	7.6	6.2	9.0	89	15				82	400	290
1311	10/02	1.2				6.7	7.4	5.9	10.0	92	12				85	100	0
1352	10/16	0.8				6.0	3.6	2.0	9.8	90	12				80	500	200
1470	10/30	0.6				5.4	1.8	0.4	11.1	94	8				65	220	20
1563	11/13	0.6				5.6	2.3	0.9	11.4	87	4				58	360	30
1660	11/27	0.4	45	11.0	10.4	6.0	2.7	0.9	12.4	90	2	51	33	0.18	60	90	4
1715	12/11	0.4				6.1	3.9	2.3	12.8	88	0				67	80	2
1762	12/26	0.5				6.2	4.0	2.8	13.2	90	0				68	50	1
AVG.		1.1	54	13.2	11.5	6.31	5.13	3.58	10.8	92	10	56	37	0.48	66	124	41
MAX.		2.5	65	17.9	14.2	6.7	8.1	6.6	14.0	100	23	66	42	1.00	85	500	290
MIN.		0.4	42	11.0	9.5	5.4	1.8	0.4	7.6	86	0	51	32	0.18	50	8	0

QUABBIN LABORATORY RECORDS 1995
WARE RIVER AND TRIBUTARIES
WARE RIVER--@ SHAFT #11A

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL

Water diverted from Shaft #8 into Shaft #11A on June 5,6,7,and 8. No samples collected.

QUABBIN LABORATORY RECORDS 1995
WARE RIVER AND TRIBUTARIES
(111)(B6) QUEEN LAKE--@ ROAD CULVERT

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
26	01/09	0.6				6.6	5.4	3.8	12.8	95	3				48	120	1
78	01/23	0.4				6.3	4.7	3.3	12.2	88	2				47	130	1
136	02/06	0.5				6.5	5.0	3.4	12.4	85	0				48	75	2
179	02/21	0.4	10	6.7	13.4	6.5	4.7	3.1	12.6	91	2	38	27	0.04	50	50	0
223	03/06	0.4				6.6	4.9	3.3	12.2	91	3				50	50	2
266	03/20	0.4				6.6	6.0	4.1	11.8	92	5				45	46	1
334	04/03	0.3				6.5	4.7	3.0	12.0	92	4				50	30	0
387	04/18	0.4				6.4	5.1	3.9	11.4	94	7				48	15	1
470	05/01	0.5				6.5	4.7	3.6	10.2	92	11				48	13	4
515	05/15	0.6	8	8.0	9.7	6.6	5.8	4.4	9.5	88	12	38	24	0.08	50	50	5
599	05/30	0.8				6.6	6.9	5.5	8.8	87	15				50	300	100
638	06/12	0.7				6.7	6.3	4.6	8.7	90	17				50	60	24
771	06/26	0.7				6.8	6.8	5.1	7.7	85	21				52	500	50
820	07/10	0.8				6.7	7.2	5.9	8.0	84	18				52	350	210
944	07/24	0.9				6.7	6.6	5.1	7.7	87	22				53	300	50
988	08/07	0.8				6.7	6.4	4.9	8.2	84	17				53	800	280
1113	08/21	1.0	23	8.9	11.8	6.8	7.0	5.5	7.5	79	18	50	32	0.67	53	350	40
1271	09/18	1.2				6.6	7.2	5.9	8.9	86	14				58	1,400	800
1312	10/02	1.2				6.7	7.7	6.3	9.0	79	10				63	300	0
1353	10/16	0.5				6.5	5.2	4.1	9.6	91	13				50	300	20
1471	10/30	0.5				6.4	5.0	3.9	10.7	94	10				50	180	20
1564	11/13	0.8				6.5	4.5	3.3	11.8	95	6				48	280	2
1661	11/27	0.5	13	10.4	12.7	6.6	5.6	4.2	12.4	92	3	37	22	0.05	50	110	2
1716	12/11	0.4				6.6	5.4	3.7	12.9	91	1				50	90	0
1763	12/26	0.5				6.6	5.8	4.3	13.0	91	1				50	80	1
AVG.		0.6	14	8.5	11.9	6.58	5.78	4.33	10.5	89	9	41	26	0.21	51	239	65
MAX.		1.2	23	10.4	13.4	6.8	7.7	6.3	13.0	95	22	50	32	0.67	63	1,400	800
MIN.		0.3	8	6.7	9.7	6.3	4.5	3.0	7.5	79	0	37	22	0.04	45	13	0

QUABBIN LABORATORY RECORDS 1995
WARE RIVER AND TRIBUTARIES
(112)(B2) BURNSHIRT RIVER--@ WILLIAMSVILLE RD.

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
27	01/09	0.4				5.6	2.1	0.6	15.8	111	1				48	60	2
79	01/23	0.3				5.5	1.8	0.5	13.6	98	2				43	50	0
137	02/06	0.3				5.9	3.2	1.8	12.4	87	1				50	30	0
180	02/21	0.3	42	10.3	10.4	6.0	3.6	2.0	12.6	89	1	51	38	0.18	52	21	2
224	03/06	0.3				5.9	3.1	1.5	12.5	90	2				62	60	29
267	03/20	0.5				5.9	2.6	0.2	11.8	91	4				42	21	1
335	04/03	0.4				5.9	2.6	1.2	11.8	92	5				45	21	13
388	04/18	0.4				5.9	2.5	1.0	10.7	90	8				47	50	21
471	05/01	0.4				6.1	2.5	1.1	9.9	89	11				48	18	6
516	05/15	0.6	48	9.1	9.9	6.1	2.9	1.2	9.3	88	13	40	21	0.28	47	150	90
600	05/30	0.8				6.2	3.7	2.1	8.1	83	17				45	300	100
639	06/12	0.7				6.1	3.3	1.9	8.2	88	19				42	30	10
772	06/26	0.8				6.2	4.7	3.0	7.6	86	22				43	300	120
821	07/10	1.5				6.1	4.5	2.6	7.1	76	19				43	120	70
945	07/24	1.0				6.2	4.8	3.4	6.9	79	23				47	100	20
989	08/07	1.2				6.3	5.2	3.8	7.2	77	19				47	110	60
1114	08/21	1.2	80	9.4	10.9	6.3	5.4	4.1	7.1	76	19	42	19	0.97	45	80	20
1157	09/05	1.5				6.3	5.7	4.2	7.3	77	18				48	40	10
1272	09/18	1.3				6.3	5.3	3.7	8.3	82	15				48	600	370
1313	10/02	1.2				6.2	4.2	2.8	9.4	85	11				48	110	20
1354	10/16	0.6				5.7	2.6	1.6	9.3	82	10				52	100	40
1472	10/30	0.4				5.5	1.7	0.5	10.7	94	10				60	200	30
1565	11/13	0.4				5.2	1.7	0.4	11.8	92	5				52	160	4
1662	11/27	0.3	43	9.9	10.3	5.6	2.2	0.4	12.0	89	3	45	27	0.13	50	80	0
1717	12/11	0.3				5.8	2.6	1.2	12.5	88	1				52	50	4
1764	12/26	0.3				5.9	2.5	1.2	13.0	89	0				53	50	0
AVG.		0.7	53	9.7	10.4	5.95	3.35	1.85	10.3	87	10	45	26	0.39	48	112	40
MAX.		1.5	80	10.3	10.9	6.3	5.7	4.2	15.8	111	23	51	38	0.97	62	600	370
MIN.		0.3	42	9.1	9.9	5.2	1.7	0.2	6.9	76	0	40	19	0.13	42	18	0

QUABBIN LABORATORY RECORDS 1995
WARE RIVER AND TRIBUTARIES
(103)(B1) BURNSHIRT RIVER--@ RT.#62

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
34	01/09	0.4				5.6	2.0	0.2	15.3	105	0				48	20	0
86	01/23	0.4				5.5	1.5	0.1	13.2	95	2				42	45	0
143	02/06	0.3				5.7	2.4	0.6	12.2	83	0				48	10	6
186	02/21	0.3	42	8.9	11.7	5.9	2.6	1.0	13.4	92	0	44	34	0.18	48	42	1
230	03/06	0.3				5.9	2.1	0.7	12.7	89	1				53	31	4
274	03/20	0.3				6.0	2.6	0.4	12.0	94	5				40	26	2
336	04/03	0.3				6.0	2.3	0.9	11.6	91	5				48	25	0
389	04/18	0.4				6.0	2.5	1.2	11.4	94	7				45	36	1
472	05/01	0.6				6.1	2.9	1.7	10.5	95	11				45	28	6
517	05/15	0.7	50	8.1	7.2	6.1	3.2	1.9	9.1	86	13	42	24	0.32	43	50	14
601	05/30	0.8				6.3	3.0	1.6	9.0	91	16				42	40	8
640	06/12	0.8				6.1	4.0	2.4	8.3	87	18				40	80	20
773	06/26	1.2				6.3	4.3	2.3	7.5	83	21				42	150	60
822	07/10	1.2				6.5	4.7	3.4	8.4	87	17				40	100	30
946	07/24	0.9				6.5	5.3	3.9	7.6	84	21				43	130	30
990	08/07	1.3				6.4	4.4	2.6	8.3	87	18				42	200	50
1115	08/21	0.8	70	7.9	9.3	6.6	5.5	4.1	8.5	86	16	40	20	0.95	42	110	10
1158	09/05	0.5				6.5	5.7	4.2	9.1	90	15				42	100	20
1273	09/18	0.7				6.5	5.0	3.5	9.2	89	14				43	280	150
1314	10/02	0.4				6.4	5.2	3.9	10.4	92	10				43	230	10
1355	10/16	0.5				5.7	2.5	1.2	9.3	84	11				50	300	120
1473	10/30	0.4				5.3	1.4	0.0	10.6	89	8				58	200	20
1566	11/13	0.4				5.1	1.1	0.0	11.6	89	4				52	160	10
1663	11/27	0.3	43	7.8	10.0	5.7	2.5	1.0	12.4	92	3	44	28	0.13	48	50	2
1718	12/11	0.3				5.7	2.1	0.5	12.6	86	0				50	50	1
1765	12/26	0.4				5.8	2.6	1.0	14.0	96	0				50	46	0
AVG.		0.6	51	8.2	9.6	6.01	3.21	1.70	10.7	90	9	43	27	0.40	46	98	22
MAX.		1.3	70	8.9	11.7	6.6	5.7	4.2	15.3	105	21	44	34	0.95	58	300	150
MIN.		0.3	42	7.8	7.2	5.1	1.1	0.0	7.5	83	0	40	20	0.13	40	10	0

QUABBIN LABORATORY RECORDS 1995
WARE RIVER AND TRIBUTARIES
(115) BRIGHAM POND---@ OUTLET

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
29	01/09	0.4				5.6	2.2	0.8	15.1	106	1				38	60	1
81	01/23	0.4				5.6	2.2	0.7	12.8	93	2				35	23	1
139	02/06	0.4				5.8	3.2	1.6	12.2	86	1				40	7	0
182	02/21	0.4	45	9.5	11.5	5.9	3.3	1.7	12.8	90	1	44	31	0.13	42	31	0
226	03/06	0.4				6.0	3.6	2.1	13.0	89	0				42	8	0
269	03/20	0.4				6.0	3.4	0.9	12.0	94	5				38	12	1
337	04/03	0.5				6.2	3.5	2.0	11.6	96	7				40	5	0
390	04/18	0.5				6.1	3.2	1.9	11.0	95	9				40	26	3
473	05/01	0.6				6.2	3.2	1.9	9.8	90	12				40	8	3
518	05/15	0.7	55	8.8	9.6	6.3	3.9	2.1	9.3	88	13	40	21	0.18	40	35	6
602	05/30	0.8				6.3	5.0	3.4	7.6	80	18				42	200	90
641	06/12	0.6				6.1	4.8	3.1	7.5	80	19				38	60	40
774	06/26	0.8				6.5	5.0	3.4	7.4	87	24				42	50	20
823	07/10	0.9				6.4	5.9	4.5	6.8	78	23				42	140	90
947	07/24	1.0				6.5	5.4	3.8	7.1	87	26				43	20	10
991	08/07	1.3				6.4	5.4	3.9	6.7	76	22				42	60	31
1116	08/21	0.9	65	9.8	10.4	6.5	5.2	3.9	7.2	84	24	42	19	0.60	42	140	10
1315	10/02	0.8				6.4	4.7	3.2	9.4	93	15				43	40	10
1356	10/16	0.6				5.8	3.7	2.6	8.0	71	10				55	250	50
1474	10/30	0.4				5.2	1.6	0.2	9.8	87	10				53	150	40
1567	11/13	0.5				5.3	1.5	0.3	11.4	89	5				50	150	34
1664	11/27	0.4	55	7.7	11.0	5.7	2.1	0.6	12.2	91	3	47	27	0.16	45	70	0
1719	12/11	0.4				5.7	2.8	1.2	12.8	93	2				48	50	1
1766	12/26	0.4				5.7	2.7	1.5	13.1	92	1				47	70	1
AVG.		0.6	55	9.0	10.6	6.01	3.65	2.14	10.3	88	11	43	25	0.27	43	69	18
MAX.		1.3	65	9.8	11.5	6.5	5.9	4.5	15.1	106	26	47	31	0.60	55	250	90
MIN.		0.4	45	7.7	9.6	5.2	1.5	0.2	6.7	71	0	40	19	0.13	35	5	0

QUABBIN LABORATORY RECORDS 1995
WARE RIVER AND TRIBUTARIES
(116) ASNACOMET POND---@ OUTLET

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
30	01/09	0.4				6.5	4.5	3.0	16.3	118	2				35	4	0
82	01/23	0.4				6.4	3.7	2.1	12.4	90	2				32	16	1
140	02/06	0.3				6.5	4.3	2.9	12.2	86	1				35	13	0
183	02/21	0.3	7	5.1	9.6	6.5	4.5	3.0	13.1	95	2	31	21	0.06	38	5	0
227	03/06	0.3				6.4	3.9	2.2	12.4	95	4				37	7	0
270	03/20	0.4				6.5	4.3	2.5	12.2	95	5				32	6	0
338	04/03	0.3				6.5	3.6	2.2	11.8	95	6				33	13	0
391	04/18	0.3				6.4	3.4	2.1	11.6	96	7				32	12	0
474	05/01	0.3				6.5	3.5	2.1	10.2	92	11				32	6	0
519	05/15	0.3	5	6.0	8.1	6.5	3.7	2.4	9.7	92	13	28	17	0.03	33	10	0
603	05/30	0.4				6.5	3.3	1.9	8.5	86	16				33	130	34
642	06/12	0.4				6.6	3.4	1.9	8.5	93	20				33	100	50
775	06/26	0.4				6.6	4.1	2.5	7.7	90	24				35	50	6
992	08/07	0.4				6.5	3.7	2.4	7.6	89	24				35	80	35
1475	10/30	0.3				6.2	3.0	1.9	9.8	90	12				35	26	7
1568	11/13	0.4				6.3	4.2	3.1	10.2	88	9				37	20	0
1665	11/27	0.4	8	6.0	8.2	6.5	4.5	3.0	11.0	88	6	27	16	0.10	37	33	0
1720	12/11	0.3				6.5	3.7	2.2	12.1	87	2				38	30	0
1767	12/26	0.3				6.4	3.8	2.3	12.6	91	2				38	19	0
AVG.		0.3	7	5.7	8.6	6.46	3.85	2.41	11.0	92	9	29	18	0.06	35	31	7
MAX.		0.4	8	6.0	9.6	6.6	4.5	3.1	16.3	118	24	31	21	0.10	38	130	50
MIN.		0.3	5	5.1	8.1	6.2	3.0	1.9	7.6	86	1	27	16	0.03	32	4	0

(116A) ASNACOMET POND---@ BEACH

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
776	06/26	2.5				6.6	4.0	2.4	7.7	92	25				37	80	14
824	07/10	0.3				6.6	4.2	2.9	7.0	82	24				33	5	1
948	07/24	0.4				6.6	3.7	2.3	7.5	92	26				37	40	8
993	08/07	1.0				6.7	3.3	1.8	7.8	91	24				35	90	36
1117	08/21	0.3	5	6.8	9.6	6.7	3.5	2.2	7.8	93	25			0.04	35	5	4
AVG.		0.9				6.64	3.74	2.32	7.6	90	25				35	44	13
MAX.		2.5				6.7	4.2	2.9	7.8	93	26				37	90	36
MIN.		0.3				6.6	3.3	1.8	7.0	82	24				33	5	1

QUABBIN LABORATORY RECORDS 1995
WARE RIVER AND TRIBUTARIES
(107) WEST BR. OF WARE RIVER--@ RT. #62

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
31	01/09	0.5				5.7	2.7	1.2	14.6	103	1				45	18	0
83	01/23	0.4				5.7	2.8	1.3	12.1	87	2				42	22	1
141	02/06	0.4				5.9	3.5	1.6	11.6	79	0				48	20	1
184	02/21	0.4	45	10.4	12.7	6.1	3.8	2.3	12.2	86	1	49	36	0.17	52	29	1
228	03/06	0.4				6.1	3.9	2.5	12.2	86	1				55	50	2
271	03/20	0.3				6.1	3.9	1.9	11.5	90	5				42	35	1
339	04/03	0.4				6.1	3.2	1.7	10.6	83	5				47	50	2
392	04/18	0.5				6.0	3.9	2.5	9.5	80	8				47	40	0
475	05/01	0.6				6.1	4.0	2.8	8.0	72	11				50	16	3
520	05/15	0.8	60	10.9	10.7	6.1	5.0	3.4	7.1	66	12	45	24	0.40	50	100	65
604	05/30	1.0				6.2	6.2	4.7	6.8	68	16				50	90	40
643	06/12	1.0				6.1	6.0	4.5	6.0	63	18				43	200	80
777	06/26	1.7				6.2	7.4	5.5	3.5	40	22				50	400	150
825	07/10	1.7				6.2	8.1	6.4	4.8	52	20				52	250	112
949	07/24	1.8				6.2	9.2	7.7	3.4	39	23				60	140	70
994	08/07	1.3				5.8	4.7	3.2	5.5	59	19				97	400	240
1118	08/21	2.5	120	14.4	13.3	6.3	11.6	10.0	3.1	34	20	58	31	2.60	62	400	220
1159	09/05	2.5				6.2	9.5	7.9	4.1	42	17				62	600	130
1274	09/18	3.7				5.9	7.3	5.7	4.5	43	14				118	TNTC	1,200
1316	10/02	1.2				5.8	4.7	3.1	7.8	72	12				122	130	20
1357	10/16	0.6				5.3	2.3	0.9	6.3	57	11				72	300	70
1476	10/30	0.4				5.1	1.9	0.5	8.7	75	9				58	150	10
1569	11/13	0.4				5.3	1.6	0.5	10.8	84	5				53	270	10
1666	11/27	0.3	50	9.6	11.2	5.6	2.2	0.8	11.4	82	2	50	31	0.18	52	60	2
1721	12/11	0.3				5.7	3.0	1.4	11.8	81	0				57	90	1
1768	12/26	0.3				5.7	2.8	1.5	12.1	83	0				57	47	4
AVG.		1.0	69	11.3	12.0	5.90	4.82	3.29	8.5	69	10	51	31	0.84	59	294	94
MAX.		3.7	120	14.4	13.3	6.3	11.6	10.0	14.6	103	23	58	36	2.60	122	TNTC	1,200
MIN.		0.3	45	9.6	10.7	5.1	1.6	0.5	3.1	34	0	45	24	0.17	42	16	0

9/18 Fecal Coliform result (with the average increase of 316%) was used for Total Coliform result in place of TNTC when calculating AVG.

QUABBIN LABORATORY RECORDS 1995
WARE RIVER AND TRIBUTARIES
(108) EAST BR. OF WARE RIVER---@ NEW BOSTON

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
36	01/09	0.5				5.9	2.8	1.1	13.1	90	0				52	50	4
88	01/23	0.4				5.8	2.5	1.3	12.6	91	2				48	23	6
145	02/06	0.5				6.0	4.2	2.5	10.8	74	0				55	13	1
188	02/21	0.5	35	11.4	12.5	6.2	4.3	2.5	12.0	82	0	49	39	0.16	57	41	2
232	03/06	0.4				6.2	3.7	2.0	13.0	89	0				57	40	9
276	03/20	0.3				6.2	4.2	2.3	11.6	91	5				48	14	9
340	04/03	0.4				6.3	4.4	3.0	11.5	86	3				52	5	1
393	04/18	0.5				6.2	3.7	2.4	10.2	82	6				52	10	8
476	05/01	0.8				6.3	5.2	3.9	9.4	83	10				53	10	7
521	05/15	0.9	55	12.3	9.6	6.4	5.0	3.2	8.4	79	13	49	28	0.33	53	100	42
605	05/30	1.2				6.3	6.4	4.8	7.8	78	16				57	600	400
644	06/12	1.2				6.4	6.8	5.2	7.4	76	17				53	250	90
778	06/26	1.5				6.5	8.9	7.1	5.7	64	22				62	200	60
826	07/10	1.8				6.4	9.4	8.0	6.0	64	19				63	120	10
950	07/24	1.8				6.4	10.7	9.1	5.4	61	22				70	110	40
995	08/07	1.5				6.5	9.3	7.8	6.9	72	18				72	600	340
1119	08/21	1.5	65	12.3	16.2	6.7	11.6	10.2	6.7	69	17	63	37	1.20	73	250	130
1160	09/05	1.5				6.6	12.6	11.0	6.4	66	17				73	140	10
1275	09/18	2.7				6.5	11.8	10.1	7.2	69	14				75	1,200	800
1317	10/02	0.9				6.3	8.8	7.3	7.3	63	9				80	90	0
1358	10/16	0.5				5.7	4.2	3.0	7.5	68	11				92	400	100
1477	10/30	0.4				5.4	1.8	0.7	9.7	82	8				57	150	60
1570	11/13	0.5				5.5	2.2	0.8	10.6	81	4				52	280	50
1667	11/27	0.3	38	9.8	11.6	5.9	3.2	1.6	11.8	85	2	46	31	0.13	53	41	3
1722	12/11	0.4				6.0	3.3	1.8	12.2	83	0				60	40	4
1769	12/26	0.4				6.0	3.3	1.9	11.4	78	0				60	55	2
AVG.		0.9	48	11.5	12.5	6.18	5.93	4.41	9.3	77	9	52	34	0.46	61	186	84
MAX.		2.7	65	12.3	16.2	6.7	12.6	11.0	13.1	91	22	63	39	1.20	92	1,200	800
MIN.		0.3	35	9.8	9.6	5.4	1.8	0.7	5.4	61	0	46	28	0.13	48	5	0

QUABBIN LABORATORY RECORDS 1995
WARE RIVER AND TRIBUTARIES
(105) WARE RIVER - @ BARRE FALLS

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
32	01/09	0.5				5.7	3.1	1.3	13.6	93	0				58	23	0
84	01/23	0.4				5.7	2.5	1.0	12.0	87	2				50	40	0
272	03/20	0.4				6.0	3.8	1.5	10.6	85	6				54	20	1
341	04/03	0.4				6.2	4.2	2.6	10.2	80	5				62	6	2
394	04/18	0.5				6.2	4.7	3.4	10.6	92	9				68	20	5
477	05/01	1.0				6.3	5.3	3.8	9.5	84	10				70	11	4
522	05/15	1.3	65	12.7	10.9	6.4	6.0	4.4	8.0	76	13	55	32	0.53	62	50	28
606	05/30	1.5				6.4	7.1	5.4	7.4	74	16				63	400	250
645	06/12	1.5				6.4	7.6	6.0	7.4	76	17				68	230	80
779	06/26	2.0				6.6	10.1	8.5	6.5	73	22				77	500	270
827	07/10	2.2				6.6	11.0	9.6	6.8	77	22				78	250	140
951	07/24	2.2				6.6	13.6	12.2	6.3	75	25				80	400	180
996	08/07	1.8				6.4	7.7	6.2	7.2	77	19				83	400	190
1120	08/21	1.7	65	15.8	16.3	6.7	12.7	11.1	6.9	78	22	69	44	0.88	90	130	50
1161	09/05	1.7				6.6	12.6	11.0	6.8	75	21				90	1,000	580
1276	09/18	2.2				6.6	11.9	10.5	7.5	75	16				90	900	500
1318	10/02	1.3				6.4	7.0	5.4	8.4	78	12				122	150	40
1359	10/16	0.6				5.6	2.8	1.4	8.0	72	11				98	300	100
1478	10/30	0.4				5.1	1.6	0.4	8.0	69	9				68	200	10
1571	11/13	0.6				5.4	2.2	1.0	10.4	81	5				62	350	42
1668	11/27	0.3	45	11.9	13.0	5.9	2.8	1.4	11.6	84	2	54	35	0.15	63	75	6
AVG.		1.2	58	13.5	13.4	6.18	6.68	5.15	8.7	79	13	59	37	0.52	74	260	118
MAX.		2.2	65	15.8	16.3	6.7	13.6	12.2	13.6	93	25	69	44	0.88	122	1,000	580
MIN.		0.3	45	11.9	10.9	5.1	1.6	0.4	6.3	69	0	54	32	0.15	50	6	0

QUABBIN LABORATORY RECORDS 1995
WARE RIVER AND TRIBUTARIES
(104) CANESTO + NATTY BROOKS AT JUNCTION - @ RT. #62

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
33	01/09	0.5				5.9	2.8	1.4	15.1	103	0				52	10	2
85	01/23	0.4				5.9	2.6	1.1	12.8	90	1				47	45	1
142	02/06	0.4				6.1	3.7	2.3	13.0	89	0				55	19	1
185	02/21	0.5	33	10.7	15.3	6.3	4.4	2.8	13.4	92	0	49	38	0.28	53	26	5
229	03/06	0.5				6.3	3.7	2.0	13.0	89	0				55	30	1
273	03/20	0.3				6.2	3.4	1.7	12.4	95	4				45	18	0
342	04/03	0.4				6.3	3.4	2.1	12.4	92	3				50	20	0
395	04/18	0.4				6.3	3.0	1.7	11.6	93	6				50	3	1
478	05/01	0.6				6.4	4.0	2.9	10.6	92	9				50	5	3
523	05/15	1.0	65	10.5	11.2	6.5	5.0	3.4	9.8	89	11	49	29	0.60	50	100	20
607	05/30	1.2				6.6	5.6	3.8	8.6	85	15				50	150	30
646	06/12	1.5				6.6	6.2	4.5	8.7	86	15				48	150	70
780	06/26	2.2				6.7	7.9	6.1	8.0	87	20				50	300	140
828	07/10	2.5				6.8	8.6	7.1	8.6	89	17				50	160	40
952	07/24	2.2				6.7	8.5	7.1	7.4	82	21				52	60	10
997	08/07	2.3				6.5	4.8	2.8	8.5	88	17				60	200	50
1121	08/21	2.3	130	11.7	14.0	6.8	8.8	7.1	8.8	87	15	64	33	2.00	55	120	10
1162	09/05	1.7				6.7	9.1	7.6	8.6	83	14				53	140	20
1277	09/18	1.7				6.6	7.1	5.6	9.0	85	13				53	1,300	800
1319	10/02	0.7				6.4	5.6	4.1	10.0	87	9				60	130	0
1360	10/16	0.5				5.6	2.4	1.0	10.3	91	10				70	150	40
1479	10/30	0.4				5.4	1.8	0.5	11.6	96	7				58	200	10
1572	11/13	0.5				5.3	1.3	0.3	12.6	94	3				52	140	40
1669	11/27	0.3	37	9.7	11.1	5.9	2.5	0.9	12.8	90	1	47	33	0.17	53	120	29
1723	12/11	0.4				6.0	3.3	1.8	13.0	89	0				62	50	2
1770	12/26	0.5				6.1	3.7	2.4	13.7	94	0				58	80	3
AVG.		1.0	66	10.7	12.9	6.27	4.74	3.23	10.9	90	8	52	33	0.76	54	143	51
MAX.		2.5	130	11.7	15.3	6.8	9.1	7.6	15.1	103	21	64	38	2.00	70	1,300	800
MIN.		0.3	33	9.7	11.1	5.3	1.3	0.3	7.4	82	0	47	29	0.17	45	3	0

QUABBIN LABORATORY RECORDS 1995
WARE RIVER AND TRIBUTARIES
(109) LONGMEADOW BROOK---@ MOUTH

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
37	01/09	0.5				6.1	3.9	2.1	11.3	77	0				73	14	1
89	01/23	0.4				6.2	5.2	3.7	11.0	80	2				98	24	0
189	02/21	0.4	28	27.1	15.8	6.2	7.8	6.1	7.8	53	0	78	61	0.17	118	20	1
233	03/06	0.4				6.2	7.5	5.8	9.9	68	0				140	7	0
277	03/20	0.4				6.3	5.8	3.7	10.4	81	5				82	15	1
343	04/03	0.4				6.3	7.9	6.4	9.3	69	3				125	11	0
396	04/18	0.5				6.2	7.7	6.3	7.6	64	8				135	3	0
479	05/01	1.0				6.2	10.0	8.7	5.4	48	10				142	11	0
524	05/15	1.5	65	27.6	18.1	6.3	11.7	10.1	3.1	29	13	86	61	0.85	122	80	20
608	05/30	1.5				6.3	12.7	11.1	3.8	38	16				127	350	140
647	06/12	1.3				6.2	12.2	10.7	2.3	24	17				138	300	130
781	06/26	2.2				6.4	18.8	17.1	2.6	29	21				140	400	160
829	07/10	2.7				6.4	21.1	19.2	2.9	30	18				130	300	180
953	07/24	2.8				6.4	23.7	21.8	2.0	23	23				117	110	50
998	08/07	1.7				6.1	10.8	9.0	4.5	47	18				113	350	70
1122	08/21	3.0	75	28.0	14.2	6.3	23.4	22.0	1.5	15	16	94	66	1.42	142	90	20
1163	09/05	2.5				6.3	21.0	19.4	2.1	21	16				130	400	150
1278	09/18	2.3				6.1	10.9	9.5	4.0	39	14				138	1,100	750
1320	10/02	0.6				6.0	7.2	5.9	5.2	44	8				160	190	10
1361	10/16	0.6				5.7	6.0	4.4	3.6	32	10				127	400	110
1480	10/30	0.4				5.6	3.8	2.6	8.2	69	8				102	150	50
1573	11/13	0.4				5.5	3.7	2.2	8.2	63	4				90	240	24
1670	11/27	0.3	43	27.2	16.9	6.2	5.7	4.1	10.2	72	1	85	66	0.13	127	60	0
1724	12/11	0.4				6.2	5.2	3.5	9.4	64	0				98	39	5
1771	12/26	0.4				6.1	7.2	5.8	8.3	57	0				122	15	1
AVG.		1.1	53	27.5	16.3	6.15	10.44	8.85	6.2	49	9	86	64	0.64	121	187	75
MAX.		3.0	75	28.0	18.1	6.4	23.7	22.0	11.3	81	23	94	66	1.42	160	1,100	750
MIN.		0.3	28	27.1	14.2	5.5	3.7	2.1	1.5	15	0	78	61	0.13	73	3	0

QUABBIN LABORATORY RECORDS 1995
WARE RIVER AND TRIBUTARIES
(121) MILL BROOK---@ CHARNOCK HILL RD.

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
38	01/09	0.5				6.4	7.3	5.6	12.3	84	0				147	17	1
90	01/23	0.4				6.3	5.4	3.8	11.8	83	1				153	45	1
146	02/06	0.4				6.4	8.2	6.4	10.9	75	0				175	28	2
190	02/21	0.4	30	32.6	21.6	6.5	9.1	7.2	10.4	71	0	95	81	0.27	148	42	2
234	03/06	0.4				6.4	8.0	6.5	11.3	79	1				172	18	3
278	03/20	0.4				6.5	6.9	4.7	10.7	84	5				132	3	0
344	04/03	0.5				6.5	7.5	6.0	10.6	83	5				163	17	6
397	04/18	0.4				6.4	7.5	6.3	9.5	80	8				172	3	3
480	05/01	0.8				6.5	9.9	8.6	8.3	75	11				175	24	15
525	05/15	1.2	65	31.3	19.8	6.6	12.3	10.3	8.0	76	13	101	71	1.18	142	200	100
609	05/30	1.2				6.5	13.3	11.5	7.0	70	16				150	210	60
648	06/12	1.0				6.5	11.6	9.8	6.7	70	18				163	250	80
782	06/26	1.3				6.8	16.3	14.4	6.6	75	22				170	300	90
830	07/10	1.7				6.8	24.1	22.6	5.8	63	20				180	140	30
954	07/24	2.5				6.9	33.0	31.3	5.1	58	22				187	300	100
999	08/07	3.0				6.7	21.0	19.4	6.5	70	19				158	400	170
1123	08/21	3.3	65	33.7	19.7	7.0	36.5	34.7	6.0	60	16	120	84	1.30	190	60	10
1164	09/05	2.8				6.8	28.1	26.5	6.6	68	17				180	1,000	500
1279	09/18	2.7				6.7	22.2	20.4	7.2	69	14				173	600	310
1321	10/02	0.9				6.5	12.4	10.7	8.1	72	10				190	50	10
1362	10/16	1.0				6.2	10.6	9.2	7.5	68	11				162	150	50
1481	10/30	0.5				6.1	6.4	5.3	8.8	74	8				118	120	10
1574	11/13	0.4				6.1	5.3	4.2	9.9	76	4				110	180	12
1671	11/27	0.3	40	33.2	19.3	6.4	6.8	5.4	11.0	80	2	96	74	0.13	150	37	2
1725	12/11	0.3				6.4	7.9	6.2	10.6	73	0				160	36	1
1772	12/26	0.4				6.3	8.7	7.2	10.1	69	0				158	7	0
AVG.		1.1	50	32.7	20.1	6.51	13.32	11.70	8.7	73	9	103	78	0.72	161	163	60
MAX.		3.3	65	33.7	21.6	7.0	36.5	34.7	12.3	84	22	120	84	1.30	190	1,000	500
MIN.		0.3	30	31.3	19.3	6.1	5.3	3.8	5.1	58	0	95	71	0.13	110	3	0

QUABBIN LABORATORY RECORDS 1995
WARE RIVER AND TRIBUTARIES
MOULTON POND - BELOW DAM

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
39	01/09	0.6				6.1	7.1	5.4	10.2	78	4				90	45	0
91	01/23	0.6				6.3	6.2	4.7	11.7	87	3				110	11	2
147	02/06	0.4				6.4	6.2	4.6	11.8	88	3				110	1	0
191	02/21	0.4	43	25.8	17.6	6.3	7.0	5.3	9.9	76	4	80	63	0.22	120	11	0
235	03/06	0.5				6.2	7.8	6.4	10.3	79	4				120	13	0
279	03/20	0.6				6.3	6.1	3.8	11.5	92	6				104	9	0
345	04/03	0.5				6.6	5.9	4.2	10.7	88	7				117	25	1
398	04/18	0.5				6.6	6.4	5.1	10.3	89	9				110	21	10
481	05/01	0.6				6.6	7.0	6.0	9.4	87	12				105	11	0
526	05/15	0.7	38	21.9	17.5	6.7	7.4	5.6	8.6	83	14	72	50	0.27	105	35	17
610	05/30	0.7				6.6	8.4	6.6	7.7	79	17				103	40	10
649	06/12	0.7				6.5	9.0	7.2	6.8	74	20				100	200	80
783	06/26	0.7				6.7	9.0	7.6	6.9	79	23				100	90	30
831	07/10	1.0				6.4	9.8	8.4	5.9	67	22				103	60	10
955	07/24	1.2				6.3	11.9	10.3	3.6	41	23				112	200	70
1000	08/07	1.2				6.5	10.0	8.5	6.9	75	20				103	300	50
1124	08/21	0.9	60	24.2	14.6	6.6	11.0	9.7	6.2	70	22	78	50	0.88	110	160	10
1165	09/05	1.5				6.3	13.9	12.2	4.5	49	20				120	350	70
1280	09/18	1.0				6.6	12.0	10.4	7.4	74	16				112	120	50
1322	10/02	2.0				6.4	15.3	13.8	6.2	60	14				132	580	100
1363	10/16	1.2				6.4	12.0	10.8	7.6	72	13				110	350	120
1482	10/30	1.2				6.2	7.5	6.2	8.4	74	10				93	90	20
1575	11/13	0.8				6.3	6.0	4.9	10.3	80	5				90	94	18
1672	11/27	0.5	50	14.4	18.3	6.4	5.9	4.2	11.1	83	3	71	48	0.17	90	15	1
1726	12/11	0.5				6.2	6.3	4.8	9.6	71	3				93	19	1
1773	12/26	0.7				6.1	7.4	5.9	9.0	67	3				108	10	0
AVG.		0.8	48	21.6	17.0	6.41	8.56	7.02	8.6	76	12	75	53	0.39	107	110	26
MAX.		2.0	60	25.8	18.3	6.7	15.3	13.8	11.8	92	23	80	63	0.88	132	580	120
MIN.		0.4	38	14.4	14.6	6.1	5.9	3.8	3.6	41	3	71	48	0.17	90	1	0

QUABBIN LABORATORY RECORDS 1995
WARE RIVER AND TRIBUTARIES
(110) LONG + WHITEHALL PONDS--@ OUTLET

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
41	01/09	0.4				6.4	8.0	6.5	11.5	88	4				133	28	0
93	01/23	0.4				6.4	7.2	5.8	11.5	83	2				127	40	1
149	02/06	0.4				6.5	9.8	7.9	11.4	80	1				165	12	1
193	02/21	0.4	25	34.3	18.9	6.5	7.8	6.1	11.7	87	3	90	70	0.08	143	21	0
237	03/06	0.4				6.4	7.8	5.9	12.1	90	3				153	8	0
281	03/20	0.5				6.6	6.8	4.5	12.4	97	5				120	4	0
346	04/03	0.4				6.7	6.5	5.0	11.4	94	7				142	13	0
399	04/18	0.4				6.6	6.1	4.6	10.8	93	9				150	3	1
482	05/01	0.5				6.7	7.0	5.8	9.7	92	13				152	9	1
527	05/15	0.5	20	35.0	18.4	6.8	7.3	5.7	9.0	87	14	93	71	0.13	152	13	4
611	05/30	0.5				6.9	8.4	6.6	8.7	91	18				157	8	3
650	06/12	0.6				7.0	9.5	7.7	8.0	89	21				153	7	4
784	06/26	0.5				7.1	10.5	8.8	7.5	89	25				157	27	8
832	07/10	0.5				7.0	10.5	8.9	7.5	88	24				158	45	18
956	07/24	0.7				6.9	10.7	9.1	7.1	87	26				158	14	2
1001	08/07	0.9				6.8	11.1	9.5	6.2	73	24				155	60	21
1125	08/21	0.9	27	37.8	17.0	6.9	11.1	9.7	7.0	82	24	93	68	0.28	160	11	4
1166	09/05	0.6				6.8	10.9	9.5	7.6	86	22				160	17	2
1281	09/18	0.6				6.8	10.4	9.1	7.6	80	18				160	50	27
1323	10/02	0.6				6.8	9.7	8.4	8.3	83	16				160	30	10
1364	10/16	0.5				6.7	9.0	7.9	8.3	80	14				157	45	30
1483	10/30	0.4				6.5	8.1	6.7	8.1	73	11				152	21	8
1576	11/13	0.4				6.5	7.6	6.4	9.8	79	6				130	60	3
1673	11/27	0.4	33	25.7	17.0	6.7	7.8	6.4	10.7	82	4	75	57	0.13	118	50	4
1727	12/11	0.4				6.5	7.8	6.4	10.2	78	4				132	75	0
1774	12/26	0.4				6.4	7.6	6.1	9.6	67	1				138	50	0
AVG.		0.5	26	33.2	17.8	6.69	8.65	7.12	9.4	85	12	88	67	0.16	148	28	6
MAX.		0.9	33	37.8	18.9	7.1	11.1	9.7	12.4	97	26	93	71	0.28	165	75	30
MIN.		0.4	20	25.7	17.0	6.4	6.1	4.5	6.2	67	1	75	57	0.08	118	3	0

QUABBIN LABORATORY RECORDS 1995
WARE RIVER AND TRIBUTARIES
(119) DEMON POND---@ OUTLET

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
40	01/09	0.5				6.6	9.6	8.0	12.6	94	3				82	13	1
92	01/23	0.5				6.7	9.6	8.2	12.1	87	2				78	40	5
148	02/06	0.4				6.8	10.3	8.6	12.0	87	2				88	48	0
192	02/21	0.4	28	17.0	20.5	6.8	11.7	10.0	12.6	97	4	64	49	0.06	92	23	0
236	03/06	0.4				6.8	10.9	9.1	12.7	97	4				88	8	0
280	03/20	0.3				6.8	9.6	7.5	12.1	97	6				78	14	0
347	04/03	0.4				7.0	9.3	7.8	11.6	93	6				80	20	1
400	04/18	0.4				6.9	9.2	7.7	10.9	92	8				82	2	0
483	05/01	0.5				6.9	9.8	8.6	9.3	86	12				82	13	5
528	05/15	0.6	22	15.4	16.2	6.9	10.5	9.0	9.0	87	14	54	36	0.07	82	6	3
612	05/30	0.8				6.9	11.0	9.4	7.7	81	18				83	110	43
651	06/12	0.9				6.9	12.1	10.6	7.1	77	20				83	15	10
1002	08/07	0.5				6.8	12.0	10.5	6.0	67	21				83	700	150
1365	10/16	0.5				6.7	11.9	10.6	7.2	69	14				85	140	50
1484	10/30	0.5				6.7	10.9	9.8	8.6	78	11				85	120	50
1577	11/13	0.7				6.7	9.9	8.9	10.1	79	5				83	200	90
1674	11/27	0.5	33	14.4	18.1	6.9	10.4	9.0	11.7	85	2	61	41	0.07	85	50	10
1728	12/11	0.4				6.9	10.2	8.7	12.0	84	1				88	75	50
1775	12/26	0.5				6.8	10.3	8.8	11.6	82	1				90	36	8
AVG.		0.5	28	15.6	18.3	6.82	10.48	8.99	10.4	85	8	60	42	0.07	84	86	25
MAX.		0.9	33	17.0	20.5	7.0	12.1	10.6	12.7	97	21	64	49	0.07	92	700	150
MIN.		0.3	22	14.4	16.2	6.6	9.2	7.5	6.0	67	1	54	36	0.06	78	2	0

QUABBIN LABORATORY RECORDS 1995
WARE RIVER AND TRIBUTARIES
(102) PARKER BROOK--NEAR MOUTH

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
42	01/09	0.5				6.2	4.2	2.6	13.6	93	0				83	22	0
94	01/23	0.5				6.2	3.4	1.8	12.7	92	2				73	17	1
150	02/06	0.6				6.3	4.5	3.1	13.5	92	0				92	20	0
194	02/21	0.6	43	20.0	15.0	6.5	4.8	3.3	12.4	90	2	69	55	0.40	92	30	0
238	03/06	0.5				6.4	4.9	3.5	12.6	94	3				98	41	0
282	03/20	0.6				6.4	4.4	2.6	12.7	97	4				82	37	0
348	04/03	0.6				6.4	4.6	3.2	12.8	95	3				92	25	0
401	04/18	0.6				6.4	4.3	3.0	11.6	93	6				92	0	0
484	05/01	0.7				6.5	4.9	3.5	11.2	95	8				93	20	1
529	05/15	1.2	55	22.1	12.0	6.5	4.9	3.4	10.2	90	10	72	50	0.67	90	17	8
613	05/30	1.2				6.5	5.2	3.5	9.9	93	13				88	50	32
652	06/12	1.2				6.6	6.5	4.9	9.5	92	14				98	100	30
785	06/26	1.6				6.7	6.9	5.5	9.0	91	16				110	100	60
833	07/10	1.7				6.8	7.3	6.0	9.5	92	14				112	130	40
957	07/24	2.0				6.7	7.3	5.8	8.6	89	17				112	350	100
1003	08/07	2.0				6.6	5.9	4.2	9.4	93	15				100	400	120
1126	08/21	1.7	42	26.8	14.8	6.8	7.9	6.6	9.9	91	12	77	61	0.67	115	110	20
1167	09/05	1.5				6.8	8.4	7.0	9.8	93	13				113	70	10
1282	09/18	1.3				6.6	6.5	5.1	9.9	91	12				110	300	70
1325	10/02	0.8				6.7	7.5	6.3	11.2	92	7				112	120	10
1366	10/16	0.7				6.1	4.2	3.1	10.3	89	9				105	110	20
1485	10/30	0.6				6.0	2.8	1.6	11.0	91	7				90	130	10
1578	11/13	0.7				5.8	2.3	1.1	11.6	89	4				73	190	10
1675	11/27	0.5	43	16.6	15.1	6.3	4.1	2.5	12.0	89	3	65	48	0.32	83	80	3
1729	12/11	0.5				6.4	5.2	3.8	12.8	88	0				93	100	1
1776	12/26	0.6				6.4	5.5	4.2	12.1	85	1				97	36	0
AVG.		1.0	46	21.4	14.2	6.45	5.32	3.89	11.1	91	8	71	54	0.52	96	100	21
MAX.		2.0	55	26.8	15.1	6.8	8.4	7.0	13.6	97	17	77	61	0.67	115	400	120
MIN.		0.5	42	16.6	12.0	5.8	2.3	1.1	8.6	85	0	65	48	0.32	73	0	0

QUABBIN LABORATORY RECORDS 1995
WARE RIVER AND TRIBUTARIES
(N1) NATTY POND BROOK - @ HALE RD.

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
28	01/09	0.5				5.6	4.1	2.4	10.2	70	0				62	45	3
80	01/23	0.5				5.6	2.8	1.1	12.4	85	0				52	31	0
138	02/06	0.6				5.7	4.9	3.1	7.1	49	0				68	13	0
181	02/21	0.6	50	12.9	12.9	5.9	5.3	3.3	8.7	60	0	58	41	0.46	65	10	0
225	03/06	0.5				5.8	4.8	2.9	9.2	63	0				67	80	2
268	03/20	0.4				5.9	4.4	2.4	9.2	68	3				50	75	0
349	04/03	0.4				5.9	3.9	2.6	8.7	67	4				58	50	1
402	04/18	0.4				5.8	4.5	3.2	8.1	67	7				55	35	0
485	05/01	0.7				5.9	4.9	3.6	6.5	59	11				58	18	3
530	05/15	0.8	90	13.7	10.7	6.1	6.4	5.0	5.4	51	13	55	28	0.80	58	80	15
614	05/30	1.3				6.1	9.2	7.2	4.5	45	16				62	40	10
653	06/12	1.5				6.1	10.7	9.1	3.0	32	18				58	150	80
786	06/26	2.0				6.3	12.1	10.1	3.0	34	22				63	110	10
834	07/10	3.0				6.2	12.3	10.4	3.2	34	19				65	100	60
958	07/24	2.2				6.2	12.2	10.6	3.1	35	22				65	120.	20
1004	08/07	1.8				6.1	8.8	6.8	3.1	33	18				87	50	10
1127	08/21	3.0	188	14.0	16.7	6.3	12.1	10.5	2.9	30	17	79	38	2.60	63	50	10
1168	09/05	1.7				6.2	9.4	7.9	4.2	43	17				62	250	20
1283	09/18	1.8				6.2	8.9	7.3	5.3	51	14				65	550	210
1326	10/02	1.2				6.0	6.1	4.7	7.8	69	10				70	650	0
1367	10/16	0.6				5.2	2.2	0.9	5.9	52	10				77	200	20
1486	10/30	0.4				5.1	1.7	0.2	7.7	63	7				62	200	10
1579	11/13	0.5				5.0	1.5	0.2	9.6	71	3				62	280	16
1676	11/27	0.4	48	12.1	12.1	5.6	2.6	1.2	10.4	73	1	56	35	0.27	62	130	6
1730	12/11	0.4				5.6	3.3	1.6	8.5	58	0				72	100	7
1777	12/26	0.6				5.6	4.6	3.1	7.6	52	0				70	65	0
AVG.		1.1	94	13.2	13.1	5.85	6.30	4.67	6.7	54	9	62	36	1.03	64	134	20
MAX.		3.0	188	14.0	16.7	6.3	12.3	10.6	12.4	85	22	79	41	2.60	87	650	210
MIN.		0.4	48	12.1	10.7	5.0	1.5	0.2	2.9	30	0	55	28	0.27	50	10	0

6.3 OTHER - MDC DRINKING WATER

QUABBIN LABORATORY RECORDS 1995

M.D.C. DRINKING WATER -- VISITOR CENTER DRINKING FOUNTAIN

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
100	01/24															0	0
215	02/28	0.9	5	6.9	43.7	8.3	32.1							0.13	122	0	0
315	03/29															0	0
459	04/25															0	0
587	05/23	1.8	5	6.6	39.6	8.1	30.7							0.23	113	0	0
790	06/28															0	0
959	07/25															0	0
1147	08/30	1.7	5	7.0	42.1	8.2	31.3							0.25	120	0	0
1286	09/19															0	0
1389	10/24															0	0
1649	11/21	0.3	5	9.3	47.8	7.5	31.9							0.05	133	0	0
1782	12/27															0	0
AVG.		1.2	5	7.5	43.3	8.0	31.5							0.17	122	0	0
MAX.		1.8	5	9.3	47.8	8.3	32.1							0.25	133	0	0
MIN.		0.3	5	6.6	39.6	7.5	30.7							0.05	113	0	0

M.D.C. DRINKING WATER @ MAIN OFFICE FOUNTAIN

101	01/24															0	0
216	02/28	1.0	5	7.0	42.6	8.3	32.1							0.13	122	0	0
316	03/29															0	0
460	04/25															0	0
588	05/23	1.7	5	6.2	39.1	8.1	30.6							0.22	113	0	0
791	06/28															0	0
960	07/25															0	0
1148	08/30	1.5	5	7.1	40.0	8.3	31.3							0.22	120	0	0
1287	09/19															0	0
1390	10/24															0	0
1650	11/21	0.4	5	10.5	46.6	7.6	31.8							0.06	133	0	0
1783	12/27															0	0
AVG.		1.2	5	7.7	42.1	8.1	31.5							0.16	122	0	0
MAX.		1.7	5	10.5	46.6	8.3	32.1							0.22	133	0	0
MIN.		0.4	5	6.2	39.1	7.6	30.6							0.06	113	0	0

M.D.C. DRINKING WATER -- BLACKSMITH SHOP FOUNTAIN

103	01/24															0	0
218	02/28	0.8	5	10.8	37.4	6.8	49.7							0.12	195	0	0
317	03/29															0	0
461	04/25															0	0
589	05/23	1.2	5	10.2	22.9	6.8	49.6							0.20	198	0	0
792	06/28															0	0
961	07/25															0	0
1149	08/30	0.9	5	8.5	30.4	7.1	50.0							0.22	198	0	0
1288	09/19															0	0
1391	10/24															0	0
1651	11/21	0.8	5	10.1	48.7	6.7	50.2							0.12	200	0	0
1784	12/27															0	0
AVG.		0.9	5	9.9	34.9	6.9	49.9							0.17	198	0	0
MAX.		1.2	5	10.8	48.7	7.1	50.2							0.22	200	0	0
MIN.		0.8	5	8.5	22.9	6.7	49.6							0.12	195	0	0

QUABBIN LABORATORY RECORDS 1995

M.D.C. DRINKING WATER - QUABBIN FORESTRY BLDG. TAP

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
102	01/24															0	0
217	02/28	0.2	5	7.2	33.6	6.8	30.3							0.06	108	0	0
318	03/29															0	0
462	04/25															0	0
590	05/23	0.3	5	7.4	34.1	6.9	31.9							0.04	112	0	0
793	06/28															0	0
962	07/25															0	0
1150	08/30	0.3	5	9.4	36.0	6.9	29.0							0.05	120	0	0
1289	09/19															0	0
1392	10/24															0	0
1652	11/21	0.3	5	11.1	31.1	6.7	26.8							0.04	110	0	0
1785	12/27															0	0
AVG.		0.3	5	8.8	33.7	6.8	29.5							0.05	113	0	0
MAX.		0.3	5	11.1	36.0	6.9	31.9							0.06	120	0	0
MIN.		0.2	5	7.2	31.1	6.7	26.8							0.04	108	0	0

M.D.C. DRINKING WATER - CEMETERY TAP

104	01/24															0	0
219	02/28	0.6	5	11.6	32.5	6.6	25.1							0.10	98	0	0
319	03/29															0	0
463	04/25															0	0
591	05/23	0.9	5	8.7	24.0	6.8	25.3							0.15	92	0	0
794	06/28															0	0
963	07/25															0	0
1151	08/30	0.9	5	7.6	25.2	6.9	25.5							0.12	90	0	0
1290	09/19															0	0
1393	10/24															0	0
1653	11/21	1.5	5	11.4	29.9	6.8	27.2							0.22	92	0	0
1786	12/27															0	0
AVG.		1.0	5	9.8	27.9	6.8	25.8							0.15	93	0	0
MAX.		1.5	5	11.6	32.5	6.9	27.2							0.22	98	0	0
MIN.		0.6	5	7.6	24.0	6.6	25.1							0.10	90	0	0

M.D.C. DRINKING WATER -- QUABBIN HILL TAP MEN

592	05/23	1.8	5	16.1	21.7	6.1	10.2							0.27	108	0	0
795	06/28															0	0
964	07/25															0	0
1152	08/30	10.0	15	15.2	24.1	6.2	9.8							0.93	108	0	0
1291	09/19															0	0
1394	10/24															3	0
1654	11/21	12.0	15	21.0	23.1	6.1	11.4							1.10	105	0	0
AVG.		7.9	12	17.4	23.0	6.1	10.5							0.77	107	0	0
MAX.		12.0	15	21.0	24.1	6.2	11.4							1.10	108	3	0
MIN.		1.8	5	15.2	21.7	6.1	9.8							0.27	105	0	0

M.D.C. DRINKING WATER -- WARE RIVER OFFICE

1677	11/27	2.0	5	97.9	164.5	7.7	39.7							0.22	490	0	0
1780	12/26															0	0

QUABBIN LABORATORY RECORDS
M.D.C. DRINKING WATER -- FROM ADMINISTRATION BLDG. WELL

DATE SAMP	INORGANIC CONTAMINANTS (ICO) mg/L	SYNTHETIC ORGANIC CONTAMINANTS (SOC) mg/L	VOLATILE ORGANIC CONTAMINANTS (VOC) ug/l	NITRATE mg/L	ASBESTOS (MFL >10um)	FLUORIDE mg/L
05/22/95	BARIUM 0.022	NOT DETECTED (ND)	NOT DETECTED (ND)			
05/22/95	SODIUM 4.1					
05/22/95	SULFATE 15.2					
06/26/95		NOT DETECTED (ND)	NOT DETECTED (ND)			
10/23/95		Di(ethylhexyl)adipate 0.00076	NOT DETECTED (ND)	0.53	NOT DETECTED (ND)	0.059
10/23/95		Di(ethylhexyl)phthalate 0.00049				

INORGANIC CONTAMINANTS	ALL OTHER PARAMETERS, NOT DETECTED (ND) METHODS, 200.7, 200.9, 245.1, 335.2, and 375.4
SYNTHETIC ORGANIC CONTAMINANTS	FOR 10/23/95, ALL OTHER PARAMETERS, NOT DETECTED (ND) METHODS, 504, 507, 508, 508A, 515.1, 525.1, 531, 531.1, 547, 548, and 549
VOLATILE ORGANIC CONTAMINANTS	METHOD 524.2
NITRATE	METHOD 4500D
ASBESTOS	METHOD 600/4-83-043
FLUORIDE	METHOD 340.2

6.4 SPECIAL INVESTIGATIONS

QUABBIN LABORATORY RECORDS 1995
216E-1 RT.122 PETERSHAM

SAMP NO.	DATE SAMP	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	FECAL
17	01/03	TNTC	153

QUABBIN EMERGENCY SPILLWAY DISCHARGE INTO RESERVOIR

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE
220	02/28	88.0	208	98.5

TRIBS. OF SITE 216E-1 RT. 122 PETERSHAM

SAMP NO.	DATE SAMP	LOCATION	TURB-IDITY	CHLO-RIDE		COLIFORM COLONIES PER 100 ML. M.F. TOTAL	FECAL	AMMONIA -N	NIT-RITE -N	NIT-RATE -N
320	03/29	#1		10.4		85	10	<0.05	<0.01	1.7
321	"	#2		22.9		145	21	<0.05	<0.01	2.8
322	"	#3		17.4		85	2	<0.05	<0.01	1.7
322	"	#3			X10 DILUTION	130	0			
323	"	#4		15.6		55	1	<0.05	<0.01	1.8
323	"	#4			X10 DILUTION	70	0			
324	"	#5		37.5		TNTC	95	0.17	<0.01	3.5
324	"	#5			X10 DILUTION	6,000	140			
325	"	#6		29.4		TNTC	0	<0.05	<0.01	0.71
326	"	#7		34.0		TNTC	0	<0.05	<0.01	0.76
327	"	#8				80	3	0.10	<0.01	2.2
327	"	#8			X10 DILUTION	150	0			

MAPS AVAILABLE FOR SITE LOCATIONS

NUTRIENT ANALYSIS PERFORMED BY REVET LABORATORY.

GULL FECAL SAMPLE -- COLLECTED ON QUABBIN RESERVOIR SURFACE

SAMP NO.	DATE SAMP	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	FECAL
378	04/11	TNTC	250

BELOW BARRE FALLS DAM -- MEN WORKING IN WATER

SAMP NO.	DATE SAMP	TURB-IDITY	DISS OXYGEN PPM	%SAT	TEMP. DEG.C.	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	FECAL
1329	10/02	1.3	10.0	94	13	122	200	50

QUABBIN LABORATORY RECORDS 1995
TOWER WATER TANK

SAMP NO.	DATE SAMP	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	FECAL
1388	10/24	30	0

MORGAN APTS. -- WARE RIVER

SAMP NO.	DATE SAMP		COLIFORM COLONIES PER 100 ML. M.F. TOTAL	FECAL
1585	11/14	X10 DILUTION	1,500	
1586	"	X10 DILUTION		920
1587	"	X100 DILUTION		400

(GULLS) -- SAMPLES TAKEN FROM QUABBIN RES.

SAMP NO.	DATE SAMP	LOCATION	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	FECAL
1609	11/17	P1 SURFACE		6
1610	"	P1 20 M		13
1611	"	P2 SURFACE		12
1612	"	P2 18 M		7
1613	"	P3 SURFACE		8
1614	"	P3 12 M		14
1615	"	P4 SURFACE		11
1616	"	P4 20 M		2
1617	"	P5 SURFACE		12
1618	"	P5 20 M		17
1619	"	PGULLS		70

MAP AVAILABLE FOR SITE LOCATIONS

(GULLS) -- SAMPLES TAKEN FROM QUABBIN RES.

SAMP NO.	DATE SAMP	LOCATION		COLIFORM COLONIES PER 100 ML. M.F. TOTAL	FECAL
1620	11/18	P7 SURFACE			244
1621	"	P7 SURFACE	X10 DILUTION		380
1622	"	P7 SURFACE	X100 DILUTION		200
1623	"	P7 5 M			*TNTC
1624	"	P7 5 M	X10 DILUTION		TNTC
1625	"	P7 5 M	X100 DILUTION		*17500
1626	"	P7 15 M			TNTC
1627	"	P7 15 M	X10 DILUTION		*1260
1628	"	P7 15 M	X100 DILUTION		*2300

* HEAVY BACKGROUND GROWTH EITHER OVERSHADOWED FECAL GROWTH ON PLATES OR PREVENTED GROWTH OUTRIGHT. IMPOSSIBLE TO GET AN ACCURATE COUNT.

MAP AVAILABLE FOR SITE LOCATIONS

QUABBIN LABORATORY RECORDS 1995
GIARDIA -- DATA RELATING TO WATER FILTERING FOR GIARDIA ANALYSIS.

SAMP NO.	DATE SAMP	LOCATION	TURB-IDITY	pH	TEMP. DEG.C.	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	FECAL
176	02/15	#7 (201) CVA INTAKE	0.3	6.54	2		2	0
177	02/15	#8 (201) CVA INTAKE	0.3	6.54	2		0	0
381	04/12	BOAT COVE TRIB. @ MOUTH	0.4	7.37	7		10	0
405	04/19	CADWELL BK. @ MOUTH	0.5	5.84	7		25	1
464	04/26	GATES BK. @ MOUTH	0.3	5.55	10	30	26	0
487	05/03	CADWELL BK. @ GATE #8 ROAD	0.4	5.90	10	38	142	0
508	05/10	BOAT COVE TRIB. @ MOUTH	0.3	7.47	13	80	60	0
509	05/10	WARE RIVER INTAKE @ SHAFT #8	1.4	6.49	13	62	28	2
533	05/17	QUABBIN RES. @ HANGER BOAT RAMP (PRE)	0.3	6.85	13	40	20	14
534	05/17	QUABBIN RES. @ HANGER BOAT RAMP (POST	0.3	6.87	13	40	19	12
593	05/24	WINSOR DAM BOAT COVE @ BEAVER LODGE	0.5	6.56	17	40	80	48
615	05/31	QUABBIN RES. @ WINSOR DAM RIP RAP	0.4	6.65	14	42	4	0
634	06/07	QUABBIN RES. @ SHAFT #12 SHORE	0.4	6.67	19	40	35	10
658	06/14	QUABBIN RES. @ HANGER BOAT RAMP	0.4	6.68	19	40	15	2
659	06/14	QUABBIN RES. @ HANGER BOAT RAMP	0.4	6.68	19	40	14	3
660	06/14	WARE RIVER INTAKE @ SHAFT #8	1.7	6.48	17	60	TNTC	41
677	06/20	WARE RIVER INTAKE @ SHAFT #8	1.7	6.50	24	62	60	20
679	06/21	QUABBIN RES. @ HANGER BOAT RAMP	0.4	6.69	21	43	13	3
680	06/21	QUABBIN RES. @ WINSOR DAM RIP RAP	0.4	6.70	22	43	10	2
796	06/28	QUABBIN RES. @ HANGER BOAT RAMP	0.3	6.99	22	40	10	4
797	06/28	QUABBIN RES. @ WINSOR DAM RIP RAP	0.3	7.00	21	40	3	2
798	06/28	WARE RIVER INTAKE @ SHAFT #8	2.0	6.65	20	73	80	10

6.5 QUABBIN RESERVOIR STATIONS

QUABBIN LABORATORY RECORDS 1995
(202) WINSOR DAM---RESERVOIR

SAMP NO.	DATE SAMP	DEPTH M	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.P. TOTAL	COLIFORM COLONIES PER 100 ML. M.P. FECAL
408	04/20	0.0								RES.ELEV 527.57		DEPTH TO C.V.A. INTAKE 18.27 METERS					0	0
409	"	0.5	0.3	5	6.4	7.8	6.78	3.9	2.7	12.30	97	5.50	27	17	0.02	43		
410	"	3.0					6.86			12.28	97	5.49				43		
411	"	6.0					6.84			12.28	97	5.40				43		
412	"	9.0					6.83			12.32	96	5.22				42		
413	"	12.0					6.81			12.37	97	5.20				42		
414	"	15.0					6.78			12.39	97	5.00				42		
415	"	18.0					6.78			12.38	97	4.95				42		
416	"	21.0					6.77			12.38	97	4.88				42		
417	"	24.0					6.73			12.34	96	4.87				42		
418	"	27.0					6.73			12.33	96	4.87				42		
419	"	30.0					6.72			12.31	96	4.83				42		
420	"	33.0					6.70			12.30	96	4.80				42		
421	"	36.0					6.68			12.28	96	4.77				42		
422	"	39.0					6.68			12.27	95	4.74				42		
423	"	40.0	0.3	5	6.2	7.8	6.67	4.0	2.8	12.27	95	4.73	28	18	0.02	42		
	BOTTOM	41.2		HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.														
535	05/17	0.0								RES.ELEV 526.75		DEPTH TO C.V.A. INTAKE 18.02 METERS					0	0
536	"	0.5	0.3	5	7.5	9.9	6.78	4.4	3.0	11.04	100	11.18	29	19	0.03	43		
537	"	3.0					6.77			11.10	100	11.16				43		
538	"	6.0					6.81			11.18	101	10.89				43		
539	"	9.0					6.84			11.42	101	10.00				43		
540	"	12.0					6.87			11.47	100	9.56				43		
541	"	15.0					6.85			11.52	100	9.01				43		
542	"	18.0					6.84			11.64	100	8.38				42		
543	"	21.0					6.82			11.69	99	8.12				42		
544	"	24.0					6.78			11.58	98	7.84				42		
545	"	27.0					6.74			11.62	98	7.77				42		
546	"	30.0					6.71			11.64	97	7.60				42		
547	"	33.0					6.69			11.60	97	7.44				42		
548	"	36.0					6.67			11.58	95	7.10				42		
549	"	39.0	0.3	5	7.1	9.1	6.60	3.7	2.1	11.50	94	6.61	29	19	0.03	42		
550	"	40.0					6.57			11.46	93	6.54				42		
	BOTTOM	40.7		HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.														
681	06/21	0.0								RES.ELEV 526.64		DEPTH TO C.V.A. INTAKE 17.98 METERS					3	2
682	"	1.0					6.70			8.88	99	21.04				44		
683	"	2.0					6.75			8.91	99	20.85				44		
684	"	3.0					6.80			9.00	99	20.45				44		
685	"	4.0	0.3	5	6.0	8.1	6.82	4.2	2.8	9.00	99	20.39	26	15	0.02	44		
686	"	5.0					6.83			9.02	99	20.31				44		
687	"	6.0					6.86			9.07	99	20.21				43		
688	"	7.0					6.85			9.13	100	20.05				43		
689	"	8.0					6.90			9.34	100	19.14				43		
690	"	9.0					6.98			9.52	100	18.11				44		
691	"	10.0					7.03			9.84	101	17.09				43		
692	"	11.0					7.10			10.84	105	14.16				43		
693	"	12.0					7.14			10.98	104	13.04				43		
694	"	13.0					7.11			11.05	102	12.23				43		
695	"	14.0					7.09			11.09	102	11.93				43		
696	"	15.0					7.07			11.11	100	11.24				43		
697	"	16.0					7.03			11.18	101	10.91				43		
698	"	17.0					6.96			11.15	100	10.66				43		
699	"	18.0					6.91			11.03	99	10.40				43		

CONTINUED

QUABBIN LABORATORY RECORDS 1995
(202) WINSOR DAM---RESERVOIR

SAMP NO.	DATE SAMP	DEPTH M	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.P. TOTAL	COLIFORM COLONIES PER 100 ML. M.P. FECAL
700	06/21	19.0					6.86			11.02	97	10.01				43		
701	"	20.0					6.81			11.03	97	9.78				43		
702	"	21.0					6.74			10.94	96	9.44				43		
703	"	22.0					6.70			10.89	95	9.30				43		
704	"	23.0					6.67			10.88	94	9.25				43		
705	"	24.0					6.65			10.87	94	9.10				43		
706	"	25.0					6.63			10.85	94	8.97				43		
707	"	26.0					6.60			10.79	93	8.84				43		
708	"	27.0	0.3	5	6.0	8.3	6.58	4.3	2.8	10.77	92	8.73	24	14	0.02	43		
709	"	28.0					6.55			10.77	92	8.67				43		
710	"	29.0					6.54			10.76	92	8.44				43		
711	"	30.0					6.52			10.76	92	8.36				43		
712	"	31.0					6.49			10.52	89	8.17				43		
713	"	32.0					6.46			10.58	89	8.07				43		
714	"	33.0					6.44			10.50	89	7.95				42		
715	"	34.0					6.42			10.41	88	7.87				42		
716	"	35.0					6.38			10.34	87	7.83				42		
717	"	36.0					6.36			10.20	85	7.75				42		
718	"	37.0					6.34			10.13	84	7.73				42		
719	"	38.0					6.32			10.06	84	7.67				43		
720	"	39.0					6.29			9.83	82	7.57				43		
721	"	40.0					6.26			9.80	82	7.55				43		
722	"	41.0					6.22			9.61	80	7.51				43		
	BOTTOM	41.2	HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.															
853	07/19	0.0								RES.ELEV 525.37		DEPTH TO C.V.A. INTAKE 17.59 METERS					0	0
854	"	1.0					6.70			8.29	96	23.42				42		
855	"	2.0					6.75			8.29	96	23.38				42		
856	"	3.0					6.81			8.29	96	23.38				42		
857	"	4.0					6.84			8.30	96	23.36				42		
858	"	5.0	0.3	5	5.9	8.4	6.85	4.0	2.8	8.31	96	23.35	30	18	0.04	42		
859	"	6.0					6.86			8.31	96	23.33				42		
860	"	7.0					6.86			8.31	96	23.32				42		
861	"	8.0					6.86			8.49	98	23.02				42		
862	"	9.0					6.97			9.66	105	20.11				42		
863	"	10.0					7.03			10.06	108	18.94				42		
864	"	11.0					7.10			10.52	109	17.30				42		
865	"	12.0					7.15			10.85	108	15.51				42		
866	"	13.0					7.17			11.00	106	14.16				42		
867	"	14.0					7.16			11.19	107	13.40				42		
868	"	15.0					7.14			11.23	105	12.50				42		
869	"	16.0					7.10			11.20	103	11.76				42		
870	"	17.0					7.04			11.16	102	11.48				42		
871	"	18.0					6.98			11.15	101	11.23				42		
872	"	19.0					6.89			11.00	99	10.86				42		
873	"	20.0					6.82			10.81	97	10.65				42		
874	"	21.0					6.75			10.78	96	10.48				42		
875	"	22.0					6.71			10.77	95	10.23				42		
876	"	23.0					6.62			10.60	94	10.09				42		
877	"	24.0					6.57			10.40	91	9.71				42		
878	"	25.0					6.51			10.42	91	9.62				43		
879	"	26.0					6.45			10.33	90	9.43				43		
880	"	27.0					6.41			10.28	90	9.30				43		
881	"	28.0					6.40			10.27	89	9.18				42		
882	"	29.0	0.3	5	6.1	8.5	6.39	3.7	2.1	10.22	88	9.08	30	18	0.04	42		

CONTINUED

SAMP NO.	DATE SAMP	DEPTH M	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
883	07/19	30.0					6.34			10.03	87	8.83				42		
884	"	31.0					6.32			9.99	85	8.74				42		
885	"	32.0					6.30			9.83	84	8.53				42		
886	"	33.0					6.26			9.65	83	8.39				43		
887	"	34.0					6.23			9.57	81	8.19				43		
888	"	35.0					6.20			9.48	80	8.09				42		
889	"	36.0					6.18			9.29	78	8.02				42		
890	"	37.0					6.14			9.15	77	7.97				43		
891	"	38.0					6.12			9.10	77	7.94				42		
892	"	39.0					6.12			9.03	76	7.91				42		
893	"	40.0					6.10			8.90	75	7.86				42		
	BOTTOM	40.4	HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.															
1023	08/16	0.0								RES.ELEV 524.21		DEPTH TO C.V.A. INTAKE 17.24 METERS					0	0
1024	"	1.0					6.88			8.08	96	24.76				43		
1025	"	2.0					6.89			8.10	96	24.66				43		
1026	"	3.0					6.89			8.14	96	24.56				42		
1027	"	4.0	0.3	5	6.5	7.5	6.90	4.1	2.8	8.15	96	24.51	33	20	0.04	42		
1028	"	5.0					6.91			8.17	96	24.49				42		
1029	"	6.0					6.92			8.19	97	24.43				42		
1030	"	7.0					6.92			8.20	97	24.40				42		
1031	"	8.0					6.92			8.30	97	24.09				42		
1032	"	9.0					6.95			9.28	106	22.58				42		
1033	"	10.0					6.99			9.76	109	21.29				42		
1034	"	11.0					7.02			10.27	112	19.83				42		
1035	"	12.0					7.11			10.71	112	18.06				42		
1036	"	13.0					7.17			10.90	110	16.09				42		
1037	"	14.0					7.20			11.23	111	14.80				42		
1038	"	15.0					7.16			11.18	108	13.79				43		
1039	"	16.0					7.13			11.31	107	12.93				43		
1040	"	17.0					7.05			11.33	105	12.25				42		
1041	"	18.0					7.03			11.35	105	11.86				42		
1042	"	19.0					6.93			10.99	100	11.39				42		
1043	"	20.0					6.78			10.71	97	10.93				42		
1044	"	21.0					6.68			10.33	93	10.80				43		
1045	"	22.0					6.53			10.10	90	10.57				43		
1046	"	23.0					6.46			10.08	90	10.27				43		
1047	"	24.0					6.39			9.80	87	10.13				43		
1048	"	25.0					6.35			9.71	86	9.93				42		
1049	"	26.0					6.31			9.72	85	9.74				42		
1050	"	27.0	0.3	5	6.8	10.0	6.27	3.6	2.3	9.66	84	9.56	32	20	0.03	42		
1051	"	28.0					6.26			9.62	84	9.35				42		
1052	"	29.0					6.23			9.36	81	9.12				42		
1053	"	30.0					6.21			9.31	81	9.08				42		
1054	"	31.0					6.18			9.11	79	8.90				42		
1055	"	32.0					6.15			9.02	77	8.73				43		
1056	"	33.0					6.13			8.82	75	8.61				43		
1057	"	34.0					6.10			8.60	74	8.44				43		
1058	"	35.0					6.09			8.42	72	8.32				43		
1059	"	36.0					6.05			8.15	69	8.22				43		
1060	"	37.0					6.04			8.00	68	8.18				42		
1061	"	38.0					6.04			7.86	66	8.18				42		
1062	"	39.0					6.01			7.78	66	8.11				43		
	BOTTOM	39.7	HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.															

CONTINUED

QUABBIN LABORATORY RECORDS 1995
(202) WINSOR DAM---RESERVOIR

SAMP NO.	DATE SAMP	DEPTH M	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
1185	09/13	0.0								RES.ELEV 522.34		DEPTH TO C.V.A. INTAKE 16.67 METERS					0	0
1186	"	1.0					6.72			8.58	94	20.43				44		
1187	"	2.0					6.76			8.58	94	20.41				44		
1188	"	3.0					6.77			8.58	94	20.41				44		
1189	"	4.0	0.3	5	6.5	10.4	6.78	4.1	2.8	8.57	94	20.41	27	17	0.03	44		
1190	"	5.0					6.78			8.57	94	20.40				44		
1191	"	6.0					6.80			8.57	94	20.40				44		
1192	"	7.0					6.78			8.57	94	20.40				44		
1193	"	8.0					6.80			8.56	94	20.39				43		
1194	"	9.0					6.83			9.16	98	19.00				44		
1195	"	10.0					6.84			10.52	107	16.75				43		
1196	"	11.0					6.75			10.17	101	15.61				43		
1197	"	12.0					6.70			10.61	105	15.02				43		
1198	"	13.0					6.70			10.61	103	14.30				43		
1199	"	14.0					6.65			10.61	102	13.76				43		
1200	"	15.0					6.65			10.62	101	13.62				43		
1201	"	16.0					6.62			10.62	100	13.10				43		
1202	"	17.0					6.60			10.57	99	12.62				43		
1203	"	18.0					6.53			10.56	99	12.45				43		
1204	"	19.0					6.43			10.03	93	12.04				43		
1205	"	20.0					6.42			10.19	93	11.61				43		
1206	"	21.0					6.37			10.00	91	11.35				43		
1207	"	22.0					6.32			9.65	87	11.20				43		
1208	"	23.0					6.28			9.57	87	10.95				43		
1209	"	24.0					6.24			9.30	83	10.72				43		
1210	"	25.0	0.3	5	6.8	10.9	6.20	3.9	2.4	9.01	81	10.45	27	18	0.03	43		
1211	"	26.0					6.15			8.81	78	10.19				43		
1212	"	27.0					6.11			8.64	76	9.88				43		
1213	"	28.0					6.09			8.52	74	9.72				43		
1214	"	29.0					6.09			8.42	74	9.54				43		
1215	"	30.0					6.04			8.12	71	9.37				43		
1216	"	31.0					6.03			7.89	68	9.00				43		
1217	"	32.0					6.01			7.72	67	8.90				43		
1218	"	33.0					5.97			7.66	66	8.80				43		
1219	"	34.0					5.97			7.52	64	8.63				43		
1220	"	35.0					5.97			7.50	64	8.63				43		
1221	"	36.0					5.93			7.20	62	8.46				43		
1222	"	37.0					5.92			7.11	61	8.43				43		
1223	"	38.0					5.91			7.02	60	8.40				44		
1224	"	39.0					5.91			6.99	60	8.35				44		
	BOTTOM	39.3	HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.															
1397	10/25	0.0								RES.ELEV 521.61		DEPTH TO C.V.A. INTAKE 16.45 METERS					5	0
1398	"	1.0	0.3	5	6.5	10.4	6.53	4.0	2.6	9.10	91	15.34	29	17	0.04	45		
1399	"	2.0					6.52			9.11	91	15.33				45		
1400	"	3.0					6.52			9.11	91	15.32				45		
1401	"	4.0					6.50			9.11	91	15.31				45		
1402	"	5.0					6.50			9.10	91	15.29				45		
1403	"	6.0					6.50			9.10	91	15.29				44		
1404	"	7.0					6.50			9.10	91	15.29				44		
1405	"	8.0					6.49			9.07	90	15.27				44		
1406	"	9.0					6.49			9.07	90	15.27				44		
1407	"	10.0					6.47			9.05	90	15.26				44		
1408	"	11.0					6.46			9.05	89	15.24				44		
1409	"	12.0					6.46			9.03	89	15.23				44		

CONTINUED

QUABBIN LABORATORY RECORDS 1995
(202) WINSOR DAM---RESERVOIR

SAMP NO.	DATE SAMP	DEPTH M	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
1410	10/25	13.0					6.45			9.03	89	15.22				44		
1411	"	14.0					6.44			9.00	89	15.21				43		
1412	"	15.0					6.43			8.98	88	15.17				44		
1413	"	16.0					6.40			8.91	88	15.12				43		
1414	"	17.0					6.25			8.50	83	14.70				44		
1415	"	18.0					6.17			8.41	82	14.50				44		
1416	"	19.0					6.10			8.20	79	14.13				44		
1417	"	20.0					6.04			8.13	78	13.82				44		
1418	"	21.0					6.00			8.03	77	13.42				44		
1419	"	22.0					5.93			7.93	75	12.78				44		
1420	"	23.0					5.91			7.92	74	12.58				44		
1421	"	24.0					5.89			7.90	74	12.39				44		
1422	"	25.0					5.87			7.89	72	11.72				44		
1423	"	26.0					5.87			7.89	72	11.69				44		
1424	"	27.0					5.87			7.89	72	11.57				44		
1425	"	28.0					5.86			7.83	71	11.24				44		
1426	"	29.0					5.85			7.73	70	11.23				44		
1427	"	30.0					5.85			7.56	68	10.98				44		
1428	"	31.0					5.84			7.38	66	10.45				44		
1429	"	32.0					5.81			7.15	64	10.33				44		
1430	"	33.0					5.80			7.12	63	10.04				44		
1431	"	34.0					5.79			7.10	63	9.93				43		
1432	"	35.0					5.78			7.05	62	9.76				44		
1433	"	36.0					5.78			6.90	60	9.59				44		
1434	"	37.0					5.76			6.39	56	9.33				44		
1435	"	38.0	0.3	5	6.7	9.8	5.75	3.8	2.6	6.27	54	9.11	29	19	0.04	44		
	BOTTOM	38.7																
1494	11/01	0.0								RES.ELEV 521.99		DEPTH TO C.V.A. INTAKE 16.56 METERS					16	1
1495	"	0.5	0.3	5	6.9	10.3	6.43	4.2	2.7	9.10	89	14.26	32	21	0.03	45		
1496	"	3.0					6.45			9.12	88	14.22				45		
1497	"	6.0					6.44			9.11	88	14.21				44		
1498	"	9.0					6.44			9.11	88	14.19				44		
1499	"	12.0					6.44			9.09	88	14.17				43		
1500	"	15.0					6.42			9.07	88	14.16				43		
1501	"	18.0					6.41			9.08	88	14.15				43		
1502	"	21.0					6.39			8.97	87	14.06				43		
1503	"	24.0					5.92			7.41	69	12.27				43		
1504	"	27.0					5.86			7.26	66	11.60				43		
1505	"	30.0					5.84			7.02	63	10.90				43		
1506	"	33.0					5.82			6.85	60	10.18				43		
1507	"	36.0					5.81			6.39	56	9.65				43		
1508	"	37.0					5.80			6.30	55	9.50				44		
1509	"	38.0	0.3	5	6.5	10.1	5.81	3.7	2.5	6.21	54	9.44	31	21	0.06	44		
1510	"	39.0					5.81			6.13	54	9.38				44		
	BOTTOM	39.5																
1590	11/15	0.0								RES.ELEV 522.71		DEPTH TO C.V.A. INTAKE 16.78 METERS					9	3
1591	"	0.5	0.3	5	6.0	7.7	6.40	4.0	2.5	9.53	86	11.22	26	16	0.04	45	17	1
1592	"	3.0					6.38			9.40	85	11.22				45		
1593	"	6.0					6.36			9.37	85	11.17				45		
1594	"	9.0					6.35			9.39	85	11.16				45		
1595	"	12.0					6.35			9.35	85	11.14				45		
1596	"	15.0					6.34			9.34	84	11.10				45		
1597	"	18.0					6.33			9.31	84	11.06				44		
1598	"	21.0					6.33			9.29	84	11.04				44		

HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.

HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.

CONTINUED

QUABBIN LABORATORY RECORDS 1995

(202) WINSOR DAM---RESERVOIR

SAMP NO.	DATE SAMP	DEPTH M	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
1599	11/15	24.0					6.32			9.27	84	11.01				44		
1600	"	27.0					6.33			9.24	84	11.00				44		
1601	"	30.0					6.31			9.25	84	10.98				44		
1602	"	33.0	0.3	5	6.5	7.8	6.31	4.1	2.5	9.25	84	10.98	27	16	0.04	43	19	4
1603	"	36.0					6.31			9.22	83	10.98				43		
1604	"	37.0					6.30			9.22	83	10.97				43		
			HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.															
AVG.			0.3	5	6.5	9.0	6.50	3.98	2.60	9.57	88	12.23	29	18	0.03	43	6	1
MAX.			0.3	5	7.5	10.9	7.20	4.4	3.0	12.39	112	24.76	33	21	0.06	45	19	4
MIN.			0.3	5	5.9	7.5	5.75	3.6	2.1	6.13	54	4.73	24	14	0.02	42	0	0

(206) SHAFT #12---RESERVOIR

SAMP NO.	DATE SAMP	DEPTH M	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
424	04/20	0.0								RES.ELEV 527.57		DEPTH TO SHAFT 12 INTAKE 23.95 METERS					0	0
425	"	0.5	0.3	5	6.5	7.7	6.87	3.9	2.7	12.20	99	6.43	28	16	0.02	42		
426	"	3.0					6.85			12.20	98	6.20				42		
427	"	6.0					6.84			12.24	98	6.15				42		
428	"	9.0					6.81			12.24	98	6.00				42		
429	"	12.0					6.81			12.30	99	5.91				43		
430	"	15.0					6.81			12.28	99	5.77				43		
431	"	18.0					6.81			12.28	97	5.33				42		
432	"	21.0					6.80			12.28	96	5.22				42		
433	"	24.0					6.79			12.22	95	5.18				42		
434	"	26.0	0.3	5	6.3	7.9	6.76	3.7	2.6	12.20	95	5.17	26	16	0.02	42		
	BOTTOM	27.2		HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.														
551	05/17	0.0								RES.ELEV 526.75		DEPTH TO SHAFT 12 INTAKE 23.70 METERS					0	0
552	"	0.5	0.3	5	7.5	9.0	6.68	4.4	3.0	11.11	99	10.63	27	15	0.03	42		
553	"	3.0					6.70			11.41	101	10.22				42		
554	"	6.0					6.72			11.54	102	9.82				42		
555	"	9.0					6.73			11.61	100	8.99				42		
556	"	12.0					6.72			11.63	101	8.79				42		
557	"	15.0					6.71			11.49	98	8.53				42		
558	"	18.0					6.67			11.48	98	8.37				42		
559	"	21.0					6.67			11.42	98	8.33				42		
560	"	24.0					6.65			11.40	96	8.15				42		
561	"	27.0	0.3	5	6.8	9.5	6.56	3.9	2.2	11.29	95	7.89	28	17	0.03	42		
	BOTTOM	28.6		HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.														
723	06/21	0.0								RES.ELEV 526.64		DEPTH TO SHAFT 12 INTAKE 23.66 METERS					3	0
724	"	1.0					6.77			9.16	99	19.47				44		
725	"	2.0					6.82			9.23	99	19.16				44		
726	"	3.0					6.87			9.28	99	18.94				43		
727	"	4.0					6.89			9.33	100	18.79				43		
728	"	5.0					6.89			9.43	100	18.32				43		
729	"	6.0	0.3	5	6.4	8.0	6.91	4.1	2.6	9.47	99	18.17	25	13	0.03	43		
730	"	7.0					6.92			9.48	100	18.04				43		
731	"	8.0					6.95			9.54	99	17.73				43		
732	"	9.0					6.96			9.63	100	17.52				43		
733	"	10.0					6.98			9.67	100	17.17				43		
734	"	11.0					7.03			9.93	101	16.44				43		
735	"	12.0					7.04			10.07	101	16.02				43		
736	"	13.0					7.06			10.57	103	14.43				43		
737	"	14.0					7.08			10.76	100	12.71				43		
738	"	15.0					6.87			10.55	97	12.15				43		
739	"	16.0					6.84			10.78	99	11.61				43		
740	"	17.0					6.81			10.66	96	10.89				43		
741	"	18.0					6.72			10.53	94	10.47				43		
742	"	19.0					6.64			10.46	94	10.32				43		
743	"	20.0					6.59			10.37	92	10.12				43		
744	"	21.0	0.3	5	6.5	8.0	6.55	3.9	2.5	10.34	91	10.00	25	14	0.20	43		
745	"	22.0					6.52			10.18	90	9.90				43		
746	"	23.0					6.46			10.10	88	9.74				43		
747	"	24.0					6.42			10.06	88	9.65				43		
748	"	25.0					6.38			9.79	86	9.45				43		
749	"	26.0					6.36			9.97	87	9.35				43		
750	"	27.0					6.36			9.90	86	9.12				43		
	BOTTOM	27.1		HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.														

CONTINUED

QUABBIN LABORATORY RECORDS 1995
(206) SHAFT #12---RESERVOIR

SAMP NO.	DATE SAMP	DEPTH M	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
894	07/19	0.0								RES.ELEV 525.37		DEPTH TO SHAFT 12 INTAKE 23.27 METERS					3	0
895	"	1.0					6.82			8.18	95	23.56				43		
896	"	2.0					6.81			8.18	95	23.55				43		
897	"	3.0					6.81			8.18	95	23.55				43		
898	"	4.0					6.82			8.20	95	23.50				43		
899	"	5.0	0.3	5	5.8	8.6	6.83	4.1	2.9	8.20	95	23.48	30	16	0.04	43		
900	"	6.0					6.83			8.20	95	23.46				43		
901	"	7.0					6.83			8.20	95	23.45				43		
902	"	8.0					6.83			8.20	95	23.42				43		
903	"	9.0					6.86			9.25	199	21.62				43		
904	"	10.0					6.98			10.15	108	18.34				43		
905	"	11.0					7.06			10.52	107	16.72				43		
906	"	12.0					7.07			10.75	106	15.20				43		
907	"	13.0					7.05			10.75	104	14.01				43		
908	"	14.0					6.95			10.77	103	13.35				42		
909	"	15.0					6.92			10.68	100	12.72				43		
910	"	16.0					6.88			10.74	100	12.32				42		
911	"	17.0					6.81			10.79	100	11.86				43		
912	"	18.0					6.76			10.52	96	11.40				42		
913	"	19.0					6.64			10.25	93	11.00				42		
914	"	20.0	0.3	5	6.1	8.4	6.50	4.0	2.5	10.18	91	10.72	30	17	0.04	43		
915	"	21.0					6.45			9.85	88	10.38				43		
916	"	22.0					6.40			9.72	86	10.21				42		
917	"	23.0					6.36			9.63	85	10.04				43		
918	"	24.0					6.31			9.44	83	9.87				43		
919	"	25.0					6.26			9.30	81	9.71				43		
920	"	26.0					6.24			9.28	81	9.65				43		
	BOTTOM	26.6	HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.															
1063	08/16	0.0								RES.ELEV 524.21		DEPTH TO SHAFT 12 INTAKE 22.92 METERS					4	0
1064	"	1.0					6.74			8.01	95	25.10				42		
1065	"	2.0					6.80			8.04	96	24.97				42		
1066	"	3.0					6.81			8.05	96	24.94				42		
1067	"	4.0					6.83			8.05	96	24.93				42		
1068	"	5.0	0.3	5	6.8	8.2	6.86	4.1	2.8	8.05	96	24.88	33	19	0.03	42		
1069	"	6.0					6.87			8.06	96	24.84				42		
1070	"	7.0					6.87			8.06	96	24.81				43		
1071	"	8.0					6.88			8.05	96	24.76				43		
1072	"	9.0					6.88			8.05	95	24.74				42		
1073	"	10.0					6.99			10.12	110	20.15				42		
1074	"	11.0					7.02			10.28	108	17.81				42		
1075	"	12.0					7.04			10.70	109	16.57				42		
1076	"	13.0					7.02			10.73	107	15.30				42		
1077	"	14.0					7.02			10.85	106	14.62				42		
1078	"	15.0					6.96			10.93	105	14.25				43		
1079	"	16.0					6.81			10.61	100	12.92				43		
1080	"	17.0					6.75			10.57	99	12.47				42		
1081	"	18.0					6.68			10.50	97	12.01				42		
1082	"	19.0					6.59			9.96	92	11.79				42		
1083	"	20.0					6.47			9.69	89	11.50				42		
1084	"	21.0					6.40			9.54	86	11.20				42		
1085	"	22.0	0.3	5	6.9	8.8	6.35	3.6	2.4	9.32	84	10.98	33	20	0.02	42		
1086	"	23.0					6.29			9.09	82	10.79				42		
1087	"	24.0					6.21			8.37	74	10.22				42		
1088	"	25.0					6.17			8.30	73	10.07				43		

CONTINUED

QUABBIN LABORATORY RECORDS 1995
(206) SHAFT #12---RESERVOIR

SAMP NO.	DATE SAMP	DEPTH M	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
1089	08/16	26.0					6.14			8.19	72	9.98				43		
1090	"	27.0					6.13			8.18	72	9.95				43		
1091	"	28.0					6.12			8.16	72	9.88				42		
1092	"	29.0					6.09			7.70	68	9.79				43		
1093	"	30.0					6.06			7.08	61	9.15				43		
	BOTTOM	30.8	HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.															
1225	09/13	0.0								RES.ELEV 522.34		DEPTH TO SHAFT 12 INTAKE 22.35 METERS					1	0
1226	"	1.0					6.68			8.51	94	20.31				43		
1227	"	2.0					6.68			8.51	94	20.32				43		
1228	"	3.0					6.69			8.51	94	20.32				43		
1229	"	4.0					6.69			8.51	94	20.32				43		
1230	"	5.0					6.69			8.51	94	20.30				43		
1231	"	6.0					6.70			8.51	94	20.29				43		
1232	"	7.0					6.70			8.51	94	20.29				43		
1233	"	8.0	0.3	5	6.7	9.0	6.70	4.1	2.9	8.50	94	20.29	28	16	0.03	43		
1234	"	9.0					6.70			8.50	94	20.29				43		
1235	"	10.0					6.70			8.50	94	20.29				43		
1236	"	11.0					6.70			8.49	93	20.30				43		
1237	"	12.0					6.70			8.49	93	20.29				44		
1238	"	13.0					6.70			8.49	93	20.28				43		
1239	"	14.0					6.70			8.48	93	20.26				43		
1240	"	15.0					6.70			8.48	92	20.25				43		
1241	"	16.0					6.50			9.60	95	15.14				43		
1242	"	17.0					6.41			9.67	92	13.72				43		
1243	"	18.0					6.28			9.47	89	13.00				43		
1244	"	19.0					6.18			9.08	85	12.50				43		
1245	"	20.0					6.14			8.74	81	12.04				43		
1246	"	21.0	0.3	5	6.7	11.0	6.11	4.3	2.9	8.52	79	11.89	27	17	0.03	43		
1247	"	22.0					6.06			8.09	74	11.34				44		
1248	"	23.0					6.04			7.93	72	11.17				43		
1249	"	24.0					6.00			7.83	71	11.07				43		
1250	"	25.0					5.98			7.79	70	11.00				43		
	BOTTOM	25.8	HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.															
1436	10/25	0.0								RES.ELEV 521.61		DEPTH TO SHAFT 12 INTAKE 22.13 METERS					5	1
1437	"	1.0	0.3	5	6.7	11.0	6.58	4.1	3.0	9.15	91	15.32	28	15	0.04	45		
1438	"	2.0					6.59			9.15	91	15.31				44		
1439	"	3.0					6.57			9.12	91	15.31				44		
1440	"	4.0					6.57			9.12	91	15.31				44		
1441	"	5.0					6.57			9.08	90	15.31				44		
1442	"	6.0					6.56			9.08	90	15.31				44		
1443	"	7.0					6.56			9.08	90	15.31				44		
1444	"	8.0					6.56			9.08	90	15.31				44		
1445	"	9.0					6.55			9.08	90	15.31				44		
1446	"	10.0					6.54			9.08	90	15.31				44		
1447	"	11.0					6.52			9.08	90	15.31				44		
1448	"	12.0					6.51			9.08	90	15.31				44		
1449	"	13.0					6.51			9.05	90	15.31				44		
1450	"	14.0	0.3	5	6.7	10.3	6.51	3.4	2.4	9.05	90	15.31	29	17	0.04	44		
1451	"	15.0					6.51			9.05	90	15.31				44		
	BOTTOM	15.3	HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.															

CONTINUED

QUABBIN LABORATORY RECORDS 1995
(206) SHAFT #12---RESERVOIR

SAMP NO.	DATE SAMP	DEPTH M	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.P. TOTAL	COLIFORM COLONIES PER 100 ML. M.P. FECAL
1511	11/01	0.0								RES.ELEV 521.99		DEPTH TO SHAFT 12 INTAKE 22.24 METERS					6	0
1512	"	0.5	0.3	5	6.8	10.8	6.45	4.1	2.8	9.36	89	13.60	32	19	0.04	44		
1513	"	3.0					6.50			9.32	89	13.69				44		
1514	"	6.0					6.53			9.31	89	13.72				44		
1515	"	9.0					6.54			9.27	89	13.75				43		
1516	"	12.0					6.53			9.26	89	13.76				43		
1517	"	15.0					6.52			9.23	89	13.77				43		
1518	"	18.0					6.51			9.23	89	13.77				43		
1519	"	21.0					6.51			9.22	89	13.78				43		
1520	"	24.0					6.48			9.12	87	13.74				43		
1521	"	25.0					6.44			8.97	86	13.66				43		
1522	"	26.0					6.32			8.12	77	13.45				43		
1523	"	27.0	0.3	5	6.5	10.4	6.00	3.9	2.5	6.21	57	12.05	31	20	0.06	44		
1524	"	28.0					5.80			5.42	50	11.39				44		
	BOTTOM	28.1																
AVG.			0.3	5	6.6	9.2	6.63	3.98	2.67	9.54	93	14.46	29	17	0.04	43	3	0
MAX.			0.3	5	7.5	11.0	7.08	4.4	3.0	12.30	199	25.10	33	20	0.20	45	6	1
MIN.			0.3	5	5.8	7.7	5.80	3.4	2.2	5.42	50	5.17	25	13	0.02	42	0	0

HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.

QUABBIN LABORATORY RECORDS 1995
DEN HILL---(RESERVOIR)

SAMP NO.	DATE SAMP	DEPTH M	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
435	04/20	0.0											RES. ELEV. 527.57				1	0
436	"	0.5	0.4	13	7.5	8.5	6.77	4.1	2.9	11.67	97	7.36	32	18	0.06	44		
437	"	3.0					6.74			11.82	99	7.26				45		
438	"	6.0					6.72			11.79	96	6.50				45		
439	"	9.0					6.69			11.76	96	6.28				45		
440	"	12.0					6.65			11.66	94	6.15				46		
441	"	15.0					6.63			11.65	94	6.10				45		
442	"	18.0	0.4	15	6.8	8.4	6.60	3.9	2.8	11.60	93	6.06	32	20	0.06	45		
	BOTTOM	19.0		HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.														
562	05/17	0.0											RES. ELEV. 526.75				3	0
563	"	0.5	0.4	7	8.7	9.5	6.86	4.4	3.0	10.65	102	13.33	32	18	0.05	46		
564	"	3.0					6.86			10.73	101	13.22				46		
565	"	6.0					6.88			10.78	97	11.10				45		
566	"	9.0					6.76			10.78	94	9.74				45		
567	"	12.0					6.65			10.72	94	9.42				44		
568	"	15.0					6.57			10.55	91	9.04				44		
569	"	16.0	0.4	7	8.6	9.1	6.48	4.2	2.9	10.46	90	8.80	31	19	0.05	44		
	BOTTOM	17.1		HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.														
751	06/21	0.0											RES. ELEV. 526.64				4	0
752	"	1.0					6.71			8.33	97	23.58				45		
753	"	2.0					6.78			8.50	98	22.94				45		
754	"	3.0	0.3	7	7.5	9.1	6.81	4.6	3.1	8.65	99	22.48	28	15	0.05	45		
755	"	4.0					6.85			8.91	101	21.79				45		
756	"	5.0					6.89			9.08	101	20.85				45		
757	"	6.0					7.02			9.24	100	19.51				45		
758	"	7.0					7.02			9.10	96	18.58				45		
759	"	8.0					6.97			9.38	98	17.88				44		
760	"	9.0					6.92			9.60	97	16.01				44		
761	"	10.0					6.87			9.89	96	14.46				44		
762	"	11.0					6.66			9.67	92	13.30				44		
763	"	12.0					6.51			9.03	83	12.04				44		
764	"	13.0	0.4	7	7.7	8.8	6.40	4.0	2.5	8.80	80	11.64	28	15	0.04	45		
765	"	14.0					6.23			8.17	74	10.98				45		
766	"	15.0					6.22			8.41	75	10.46				45		
767	"	16.0					6.19			8.14	72	10.14				45		
768	"	17.0					6.17			8.00	71	10.00				45		
	BOTTOM	17.1																
921	07/19	0.0											RES. ELEV. 525.37				0	0
922	"	1.0					6.68			8.00	94	24.30				43		
923	"	2.0					6.72			8.01	95	24.27				44		
924	"	3.0					6.75			8.02	95	24.27				44		
925	"	4.0	0.3	5	6.2	9.1	6.77	4.4	3.0	8.03	94	24.13	31	16	0.04	44		
926	"	5.0					6.75			8.01	94	24.08				44		
927	"	6.0					6.71			7.94	93	23.98				44		
928	"	7.0					6.66			8.12	94	23.28				44		
929	"	8.0					6.61			8.81	98	21.24				44		
930	"	9.0					6.58			8.88	97	20.21				44		
931	"	10.0					6.68			9.55	99	17.62				44		
932	"	11.0					6.60			8.97	89	15.62				44		
933	"	12.0					6.51			8.82	86	14.49				44		
934	"	13.0					6.34			7.81	75	13.40				44		
935	"	14.0					6.18			7.21	67	12.41				45		

CONTINUED

QUABBIN LABORATORY RECORDS 1995
DEM HILL---(RESERVOIR)

SAMP NO.	DATE SAMP	DEPTH M	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
936	07/19	15.0	0.4	8	6.8	8.6	6.06	4.3	3.0	6.00	55	11.30	32	18	0.05	45		
937	"	16.0					6.03			6.61	60	10.94				45		
938	"	17.0					6.02			5.78	51	10.23				46		
939	"	18.0					5.99			5.32	47	9.95				46		
	BOTTOM	18.9		HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.														
1094	08/16	0.0											RES. ELEV. 524.21				4	1
1095	"	1.0					6.71			7.92	97	25.84				43		
1096	"	2.0					6.78			7.94	95	25.57				44		
1097	"	3.0					6.81			7.94	95	25.33				43		
1098	"	4.0					6.83			7.98	95	25.16				43		
1099	"	5.0	0.4	7	7.5	9.9	6.83	4.2	3.0	7.94	94	25.05	34	18	0.05	43		
1100	"	6.0					6.82			7.94	94	24.95				43		
1101	"	7.0					6.82			7.89	94	24.76				43		
1102	"	8.0					6.75			7.89	93	24.44				43		
1103	"	9.0					6.68			7.80	91	24.00				43		
1104	"	10.0					6.58			8.55	96	21.63				43		
1105	"	11.0					6.53			8.60	93	19.39				43		
1106	"	12.0					6.37			7.80	78	16.20				44		
1107	"	13.0					6.13			6.02	59	14.45				45		
1108	"	14.0					6.03			5.38	51	13.20				45		
1109	"	15.0	0.5	12	7.5	10.0	5.97	4.2	2.9	3.90	36	11.74	35	20	0.12	46		
1110	"	16.0					5.94			3.90	35	11.08				46		
	BOTTOM	16.8		HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.														
1251	09/13	0.0											RES. ELEV. 522.34				1	0
1252	"	1.0					6.48			8.19	90	20.27				45		
1253	"	2.0					6.51			8.20	90	20.29				45		
1254	"	3.0					6.51			8.19	90	20.29				45		
1255	"	4.0					6.55			8.18	90	20.29				45		
1256	"	5.0					6.54			8.18	90	20.29				45		
1257	"	6.0	0.4	7	6.8	8.0	6.54	4.3	2.8	8.18	90	20.29	30	17	0.06	45		
1258	"	7.0					6.54			8.19	90	20.28				45		
1259	"	8.0					6.54			8.18	90	20.29				44		
1260	"	9.0					6.54			8.18	90	20.28				44		
1261	"	10.0					6.54			8.16	89	20.25				44		
1262	"	11.0					6.53			8.12	89	20.28				44		
1263	"	12.0					6.06			5.45	56	16.60				45		
1264	"	13.0					5.92			4.50	45	15.70				45		
1265	"	14.0					5.84			3.03	28	12.18				46		
1266	"	15.0	0.8	12	7.0	10.8	5.80	4.8	3.3	2.80	26	12.01	31	20	0.28	46		
1267	"	16.0					5.82			2.31	21	11.38				47		
	BOTTOM	16.6		HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.														
1452	10/25	0.0											RES. ELEV. 521.61				6	0
1453	"	1.0	0.6	7	6.7	10.0	6.41	4.4	3.3	8.84	87	14.80	31	16	0.18	46		
1454	"	2.0					6.43			8.83	87	14.80				46		
1455	"	3.0					6.44			8.80	87	14.80				46		
1456	"	4.0					6.44			8.80	87	14.78				46		
1457	"	5.0					6.43			8.82	87	14.77				46		
1458	"	6.0					6.42			8.80	87	14.77				46		
1459	"	7.0					6.43			8.80	87	14.77				46		
1460	"	8.0					6.42			8.80	87	14.76				46		
1461	"	9.0					6.41			8.79	87	14.76				45		
1462	"	10.0					6.41			8.79	87	14.76				46		

CONTINUED

QUABBIN LABORATORY RECORDS 1995
DEN HILL---(RESERVOIR)

SAMP NO.	DATE SAMP	DEPTH M	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
1463	10/25	11.0					6.40			8.79	87	14.76				45		
1464	"	12.0					6.39			8.73	85	14.66				46		
1465	"	13.0					6.38			8.67	85	14.64				46		
1466	"	14.0					6.32			8.34	81	14.59				46		
1467	"	15.0	0.8	10	6.8	10.7	6.25	4.1	3.1	8.17	80	14.42	32	18	0.28	46		
1468	"	16.0					6.23			7.71	75	14.42				46		
	BOTTOM	16.2		HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.														
1525	11/01	0.0											RES. ELEV. 521.99				7	3
1526	"	0.5	0.5	7	7.2	10.3	6.49	4.5	3.2	9.15	86	13.01	34	20	0.16	46		
1527	"	3.0					6.54			9.14	86	13.06				46		
1528	"	6.0					6.51			9.12	86	13.07				46		
1529	"	9.0					6.49			9.08	86	13.08				46		
1530	"	12.0					6.49			9.10	86	13.00				46		
1531	"	15.0					6.49			9.28	87	12.44				47		
1532	"	16.0	0.5	10	7.2	9.7	6.48	4.4	3.3	9.31	87	12.37	36	22	0.18	47		
1533	"	17.0					6.49			9.31	87	12.37				47		
	BOTTOM	17.6		HYDROLAB USED FOR -- pH, DO, TEMP., AND COND.														
AVG.			0.5	9	7.3	9.4	6.51	4.30	3.01	8.41	84	16.04	32	18	0.11	45	3	1
MAX.			0.8	15	8.7	10.8	7.02	4.8	3.3	11.82	102	25.84	36	22	0.28	47	7	3
MIN.			0.3	5	6.2	8.0	5.80	3.9	2.5	2.31	21	6.06	28	15	0.04	43	0	0

APPENDIX

Petersham Brook
Field Survey Report
May 1, 1995

written by: Scott A. Campbell, EEI

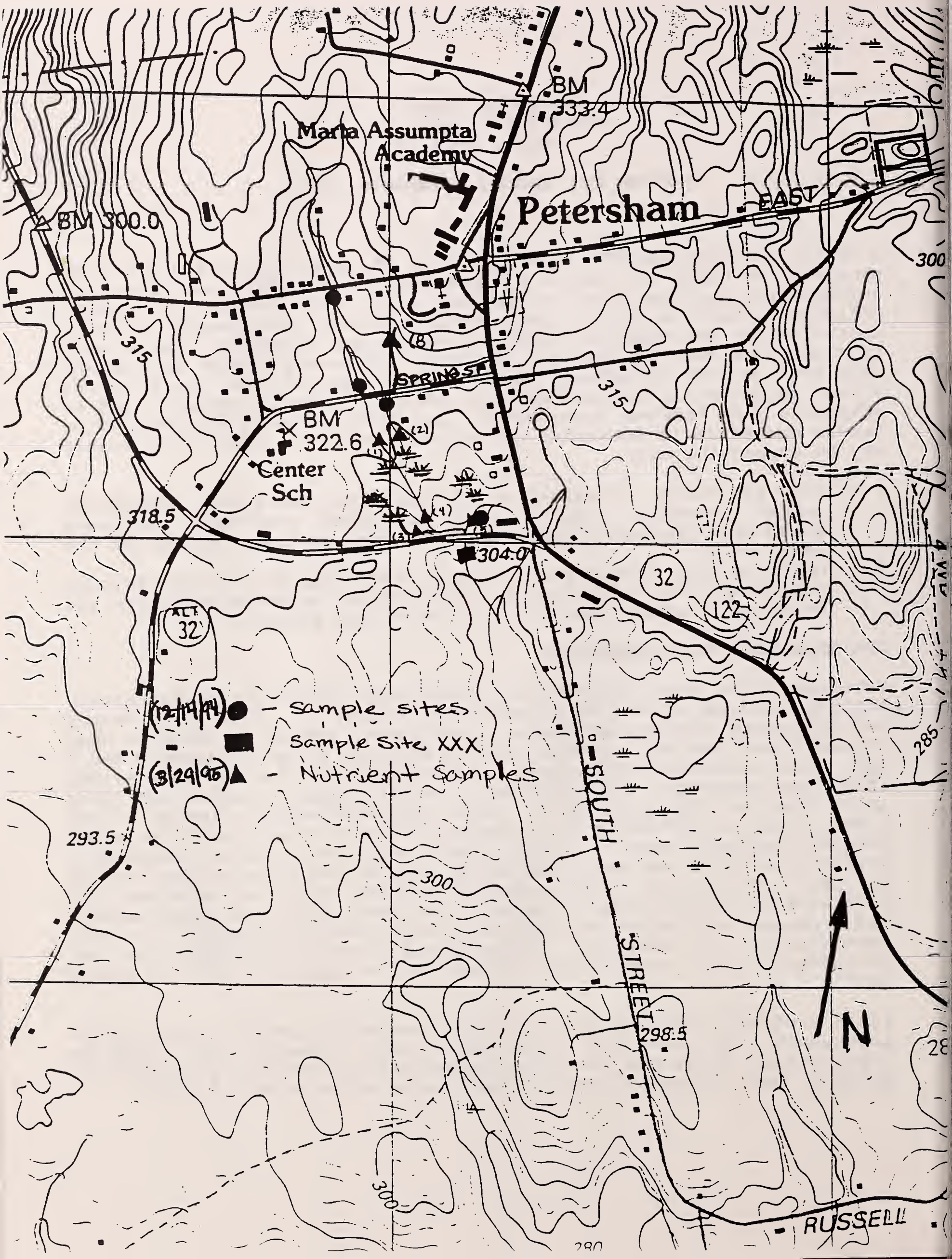
A fecal coliform count of 100 per 100 ML M.F. in Petersham Brook prompted a round of follow-up samples to be collected from the surrounding drainage area on December 13, 1994. Follow-up results collected, found in Table 1, once again confirmed the presence of fecal contamination and suggested that its source was emanating from an area in the lower drainage basin. A review of precipitation levels and bacterial trends throughout the 1994 year implied that there was no direct relationship between surface runoff. However, results tend to suggest a link between intermittent flow patterns and high groundwater levels monitored in Petersham throughout the year. This relationship may be suggesting that:

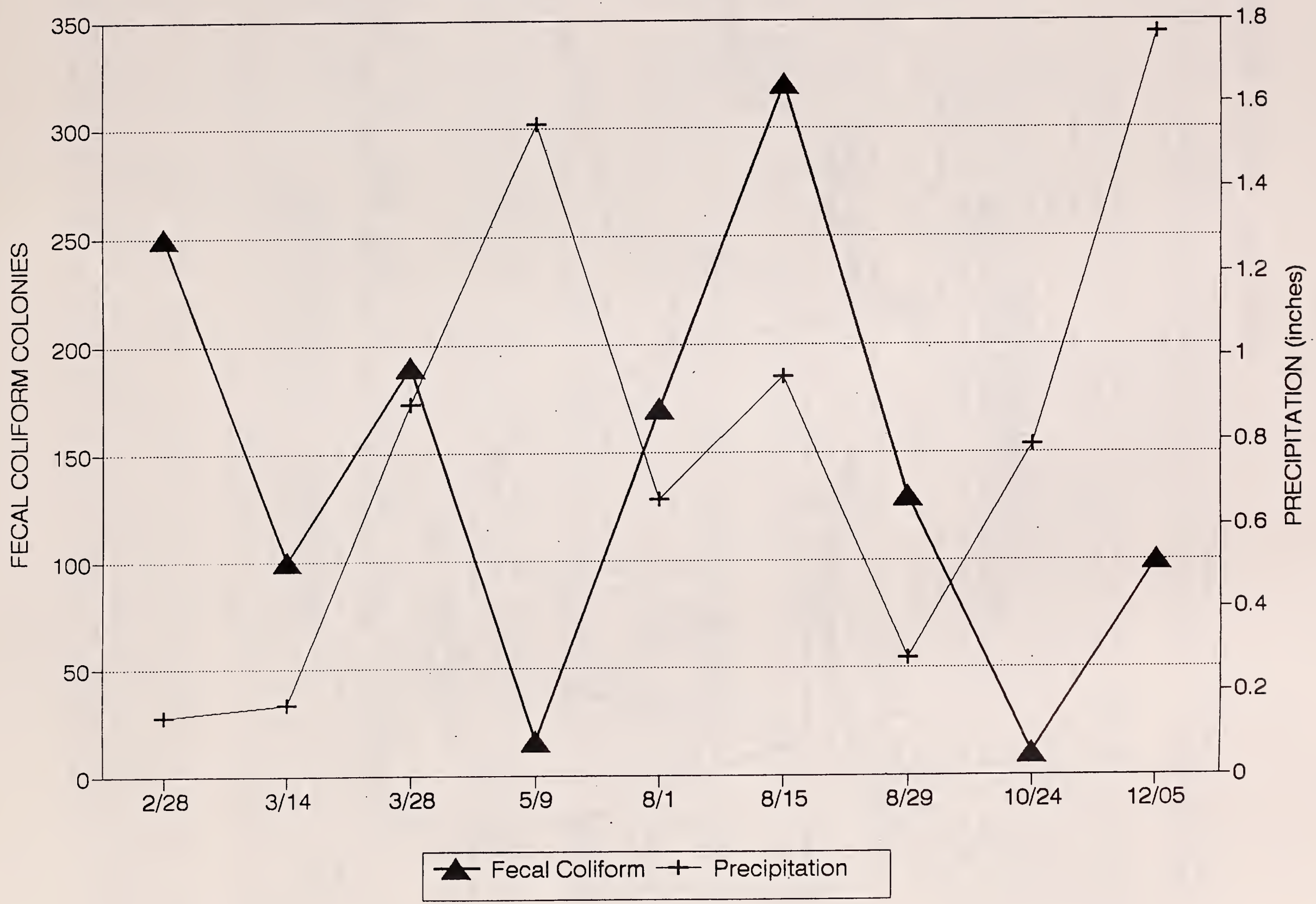
1.) that the fecal contamination is emanating from a soil adsorption system, cesspool, septic tank, or other wastewater disposal structure situated in groundwater at various times throughout the year; or,
2.) that elevated levels are naturally occurring due to the periodic "flushing" away of bacteria and nutrients accumulated within the dried up streambed and found in decomposed plants.

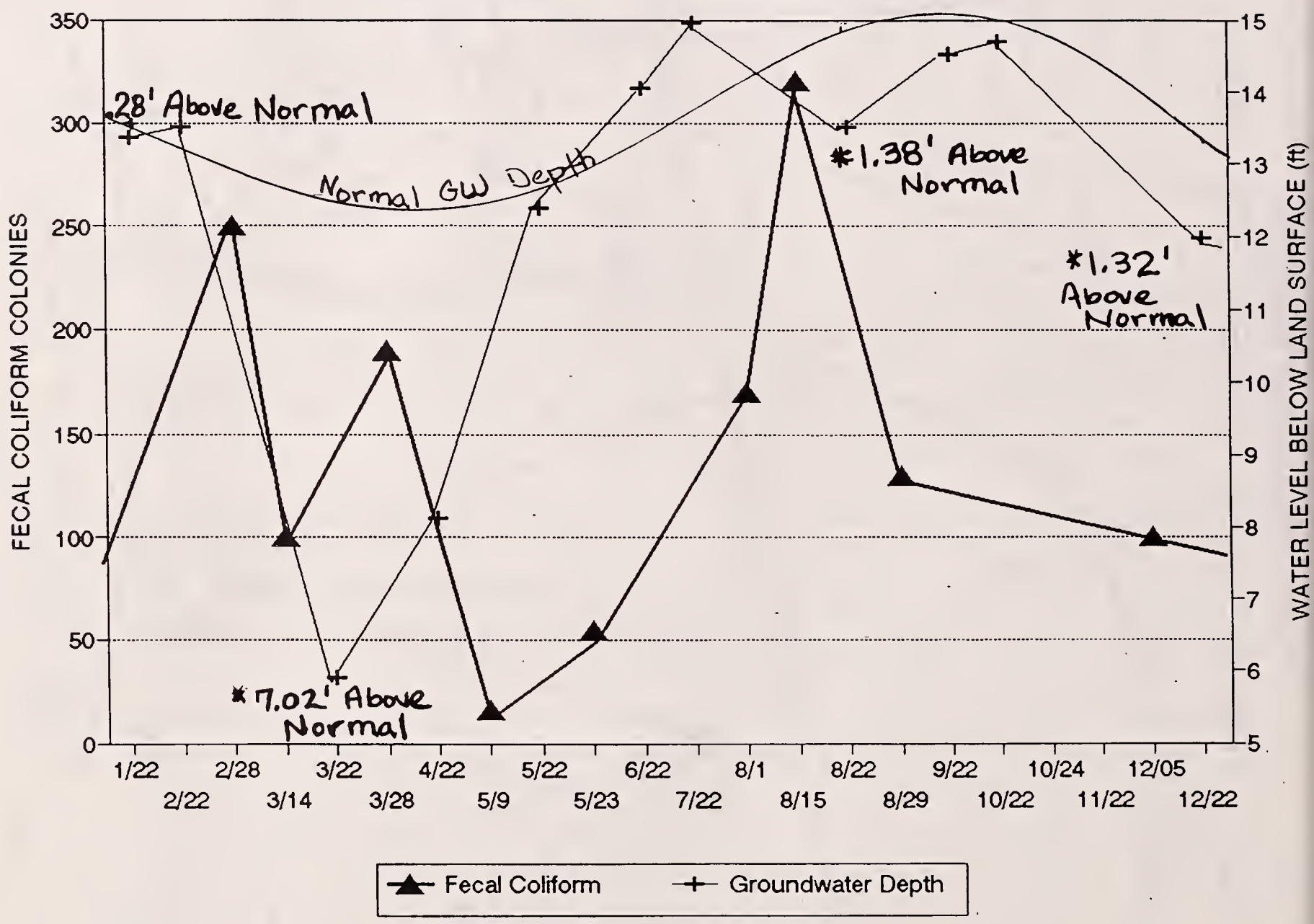
DRAINAGE AREA CHARACTERISTICS

Petersham Brook is an intermittent stream that originates in the thickly settled confines of Petersham Center (see figure 1). Flow is culverted and channeled through backyards, lush woods, and dense marshes that separate the flow into numerous smaller branches prior to crossing Route 122. For purposes of this report, the drainage area has been subdivided into three drainage areas referred to as the upper, middle, and lower (area south of Spring Street). Fecal coliform bacteria levels in the lower reaches at the Route 122 crossing have historically been elevated, ranging anywhere from 0 to 273/100ml, with no obvious connections between precipitation levels and animal populations found during initial surveys. A copy of 1994 bacterial results has been attached for reference with trends indicating very low flows during the summer months and a random fluctuation of coliform levels evident throughout the year when flowing. In addition, figures 2 and 3 contain precipitation and groundwater level comparisons throughout the year for the Petersham area.

Field studies conducted prior to March suggested lengthy travel times throughout the watershed area with minor impacts from wildlife populations. Given the limited information obtained during the initial surveys, more intensive sampling was conducted on March 29, 1995.


BM
333.4
Maria Assumpta
Academy
Petersham
EAST
BM 300.0
300
315
(8)
SPRING ST
315
BM
322.6
(2)
(1)
Center
Sch
318.5
(4)
(3)
(5)
304.0
32
122
ALT
32
(12/14/94) - Sample sites
Sample Site XXX
(3/29/96) - Nutrient Samples
285
SOUTH
293.5
300
STREET
298.5
N
RUSSELL
300
280


PETERSHAM BROOK
1994 RESULTS - SAMPLE SITE (XXX)
FECAL COLIFORM COLONIES
PRECIPITATION (inches)
350
300
250
200
150
100
50
0
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
2/28
3/14
3/28
5/9
8/1
8/15
8/29
10/24
12/05
Fecal Coliform
Precipitation


PETERSHAM BROOK
1994 RESULTS - SAMPLE SITE (XXX)
FECAL COLIFORM COLONIES
WATER LEVEL BELOW LAND SURFACE (ft)
350
300
250
200
150
100
50
0
15
14
13
12
11
10
9
8
7
6
5
1/22
2/22
2/28
3/14
3/22
3/28
4/22
5/9
5/22
5/23
6/22
7/22
8/1
8/15
8/22
8/29
9/22
10/22
10/24
11/22
12/05
12/22
28' Above Normal
Normal GW Depth
*1.38' Above Normal
*1.32' Above Normal
*7.02' Above Normal
Fecal Coliform
Groundwater Depth

SAMPLING PROTOCOL AND RESULTS

Additional sampling included bacteria, nitrogen, and chloride analysis on water entering and exiting the lower drainage basin. Parameters were selected based on the following reasons:

1) Nitrogen analysis was chosen to provide a good indication of how on-site wastewater treatment systems are functioning within the Petersham area. In a properly functioning system, nitrogen in the form of ammonia is readily converted to nitrate under aerobic conditions encountered in the soil adsorption field (This process is referred to as nitrification). The nitrate then leaches readily through the soil in concentrations ranging anywhere from 17 mg/l to 35 mg/l. In a system located in groundwater, nitrification of ammonia does not take place due to the absence of oxygen and as a result the toxic form of nitrogen is released to the environment.

   Furthermore, it was unclear on how the marsh area was either reducing or adding to the nutrient loads (ammonia is also introduced into the water via decaying plant material). By sampling at each inlet and outlet of the wetland area, conclusions can be drawn on the biological effects that the wetland has on water quality.

2) Chloride was chosen due to its relatively high levels in sewage flows and its ability to pass through wetland areas without undergoing a substantial change in its composition and concentration level. It should be noted however that the results of the sampling may be misconstrued in this instance due to the close proximity of sample sites to roadways. In particular, sample sites 3, 4, 5, 6, and 7 are all located adjacent to State Highways who utilize pure salt for de-icing during the winter.

3) Coliform organisms have been used as indicators of possible pollution problems. Studies have shown that fecal colonies are characteristically found in the intestines of warm-blooded animals. Daily per capita excretions of coliforms have been estimated between 125 and numbers in the billions.

Sample sites were selected to observe all input and output levels of contaminants as they pass through the extensive marsh area in the lower drainage basin. In addition, two control points (sites 6 and & 7) were chosen at the inlet and outlet of a large marsh under minimal impact from human contamination (with the one exception being that of roadway runoff which tends to be low in nutrients but high in chlorides). As referenced above, a goal of the sampling was to observe the effect that the wetland area has on incoming pollutant loads.

Samples were collected under dry conditions, no precipitation for the past three days, and flow could be classified as good with no intermittent periods to report since September 12, 1994. Also, current groundwater levels were at normal elevations, contrary to March of 1994 where heavy snowfall accumulation contributed to exceptionally high groundwater levels. Results are found in Table 1 on next page.

TABLE 1
Petersham Brook - March 29, 1995 Results

Sample Site	Chloride	Total Coliform	Fecal Coliform	NO3	NO2	NH4
Spring St. west (1)	10.4	85	10	1.7	<.01	<.05
Spring St. east (2)	22.9	145	21	2.8	<.01	<.05
Grange (3)	17.4	85/130	2/0	1.7	<.01	<.05
Main, R122 north (4)	15.6	55/70	1/0	1.8	<.01	<.05
R122, east (5)	37.5	6000	95/140	3.5	<.01	0.17
CP-Marsh Inlet (6)	29.4	TNTC	0	0.71	<.01	<.05
CP-Marsh Outlet (7)	34.0	TNTC	0	0.76	<.01	<.05
Outlet from stone headwall (8)	----	80/150	3/0	2.2	<.01	0.10

Bacteria

Bacterial results would suggest that the lower marsh area is effectively detaining flows for a significant length of time allowing for bacterial die-off prior to the crossing of route 122 (see sample sites 1, 2 and 4). This finding would strengthen bacterial results found at sample site #5 which showed elevated levels similar to those found at the routine sample site just fifteen feet downstream. Flow upstream of sample site #5 emerges from the north as through a small wetland marsh and from the east via a concrete headwall located approximately 50 feet west of Route 32.

Nutrients

Nitrate and ammonia results showed that levels were elevated ranging from 1.7-3.5 mg/l and <0.05-0.17 mg/l respectively. As a comparison, MDC stormwater studies conducted on the Gates Brook subwatershed, a highly urbanized drainage basin to the Wachusett Reservoir, showed that nitrate and ammonia levels ranged from 0.25-2.0 mg/l and <.02-0.08 mg/l respectively.

This comparison of a highly urbanized to a moderately developed watershed fails to take into consideration the true biological activity within the two brooks. Current results of the Petersham Brook may be reflecting the dormancy of vegetation within the extensive marsh, a major receptacle for nitrogen during plant growth. In addition, the marsh areas may be acting as sources of nitrogen as water passes through and carries nitrogen rich, decomposing material downstream. Results found within the control stream support this theory as unusually high nitrate levels (average nitrate concentration of Quabbin tributaries is roughly 0.17 mg/l) were increased as they passed through the marsh.

Other nitrogen inputs can stem from fertilizers, agricultural activities, impervious areas and failing septic systems. Much of the nitrogen was found in the nitrate form at elevated levels well below the drinking water standard of 10 mg/l. Therefore, it would appear that the nutrient levels found reflect the influence of an outside source(s) other than that which naturally occurs.

Chloride

Chloride concentrations ranged from 10 to 38 mg/l, well below the 250 mg/l Class A standard and those indicative of domestic sewage contamination. The highest levels were found adjacent to State Highways in streams with low flows (sample sites #2, #5, #6, and #7). While sample sites #1, #3 and #4 were also located beside roadways, the levels were slightly lower due to the dilution effects of larger flows. Chloride levels only differed slightly between the control stream and the Petersham area.

RECOMMENDATIONS

Results suggest that nutrients are slightly elevated above normal background levels due in large part to the agricultural and residential development that borders the brook. The increased nutrient load on the area will accelerate eutrophication of the waterbody. The concentrations and prior field investigations suggest that best management practices directed towards reducing lawn fertilization rates, improved management of agricultural wastes, and reduced impervious areas may be appropriate within the subwatershed to improve water quality.

Coliform levels were found elevated in the small drainage channel east of the Route 122 culvert crossing. Based upon initial results, it would appear that domestic sewage is not a significant source of the pollutant load. It is believed that certain watershed activities, and, perhaps to some degree, certain natural processes (e.g. plant decomposition or coliform aftergrowths) are greatly contributing to the high coliform levels. Further investigation is needed into the drainage layout along Route 32 and the possible effects that the upper wetland may be imposing upon the water quality above sample site #5. It is possible that the headwall is collecting runoff from the entire stretch of Route 32 from the bottom of the hill to the crest in the center of Petersham. DWM staff have observed an unusually high amount of sediments trapped within sample bottles collected from this routine sample site that may be contributed to roadway runoff. Also, it is common for residential street runoff flows to contain high levels (>1000 fecal) of bacteria and other pollutants due to dog traffic. The only discrepancy with this theory is the lack of correlation seen between bacteria results and precipitation events.

Therefore, given the uncertainty involved with grab sampling, it is strongly suggested that additional measures be taken that may include:

a) A routine of nutrient sampling during different seasons may offer insights into the biological activity and ecological health of the brook. The information gathered may also be used in the understanding of other problematic wetland sample sites (e.g. Longmeadow Brook).

b) While field surveys within the drainage basin are complicated by the extensive growth surrounding the marsh area and residential development, additional investigations along the small branch north of sample site #5 may be useful in identifying specific areas where mitigation may be needed.

References:

Metropolitan District Commission, 1988-1995. Quabbin Reservoir Watershed Report. Division of Watershed Management, Belchertown, MA.

Mitsch and Gosselin, 1986. Wetlands. New York, New York.

USEPA, 1993. Created and Natural Wetlands for Controlling Nonpoint Source Pollution.

Metropolitan District Commission/Department of Environmental Protection, May 1994. Gates Brook Stormwater Study (Wachusett Reservoir) 1990 through 1991. Division of Watershed Management, Boston with the Office of Watershed Management, North Grafton.

ATTACHMENTS

QUABBIN LABORATORY RECORDS 1994
(XXX) SMALL TRIB. ON RT.122 PETERSHAM-EAST OF GRANGE

SAMP NO.	DATE SAMP	TURB-IDITY	COLOR	CHLO-RIDE	HARD-NESS	pH	ST.M. ALK.	E.P.A. ALK.	DISS OXYGEN PPM	DISS OXYGEN %SAT	TEMP. DEG.C.	RESIDUE TOTAL	RESIDUE FIXED	Fe	SPEC. COND.	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL	ELEV. GAGE
13	01/03															TNTC	45	
88	01/31															TNTC	76	
123	02/14															.6	3	
158	02/28															TNTC	250	
192	03/14															300	100	
230	03/28															250	190	
269	04/11															8	0	
308	04/25															50	28	
381	05/09															34	16	
453	05/23															70	55	
488	06/06															50	11	
809	08/01															400	170	
850	08/15															500	320	
985	08/29															300	130	
1178	09/26															180	40	
1230	10/11															72	2	
1358	10/24															300	10	
1445	11/07															18	2	
1508	11/21															50	0	
1563	12/05															TNTC	100	
1620	12/19															550	130	
AVG.																	80	
MAX.																	320	
MIN.																	0	

SAMP NO.	DATE SAMP	LOCATION	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	COLIFORM COLONIES PER 100 ML. M.F. FECAL
----	03/02	Sample site XXX - Rt.122 Petersham	TNTC	273
----	"	(East trib of XXX) Spring Street, Petersham	50	0
----	"	(West trib of XXX) Spring Street, Petersham	68	5
1599	12/14	Rt.122 -- Confluence	41	3
1600	"	West St. crossing	96	2
1601	"	Spring St. crossing	110	7
1602	"	Rt.122 Brook, Petersham	500	95

FECAL COLIFORM RESULT COMPARISON

	SAMPLE SITE						
1/3/94-1/31/94	AB	BC	RB	EFB	LB	**PB**	
COLIFORM COLONIES	50	NF	4	0	0	**45**	
	0	NF	3	0	1	**NF**	
	0	NF	7	0	ND	**76**	
2/28/94-3/28/94							
COLIFORM COLONIES	0	2	4	0	ND	**250**	
	0	30	3	0	ND	**100**	
	1	6	2	0	ND	**190**	
8/1/94-8/29/94							
COLIFORM COLONIES	10	*120	30	50	90	**170**	**(PB-8/93 110 LB-8/9/93 700)**
	20	10	40	50	ND	**320**	
	70	0	40	110	500	**130**	(0.22" of rain on 8/28)
9/12/94-10/24/94	10	NF	0	30	10	**NF**	
9/26/94 (0.03" rain)	0	0	80	20	120	**40**	(BC - 50 total coliform)
	1	1	8	9	50	**2**	
	3	0	0	100	30	**10**	
11/7/94-12/14/94	1	NF	1	0	1	**2**	(0.19" rain on 11/6/94)
	1	0	0	0	0	**0**	
	0	0	20	5	3	**100**	
	0	0	2	1	2	**95**	

Dates When Petersham Brook Not Flowing:
1/19
6/20
7/5
7/18 (note: 170 fecal count on 8/1)
9/12 (note: 40 fecal count on 9/26)

AB-Atherton Brook BC-Boat Cove RB-Rand Brook EFB-East Branch Fever Brook
LB-Longmeadow Brook PB-Petersham Brook NF-No Flow ND-No Data

TABLE NO. IV

INCHES OF PRECIPITATION AT Petersham FOR

YEAR ENDING DECEMBER 31, 19 94

Date	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.06*				0.09	0.30				0.18	0.07	
2			0.39*									
3	0.35*	0.06*	0.44*	0.29				0.02				
4	0.31#											0.10
5					0.07			0.25				1.54
6	0.25*		0.02*	0.49	0.18	0.19					0.19	
7	0.70*		0.42	0.05	1.00		0.65					0.20#
8	0.16*	0.56*	0.08		0.19							
9		0.14*	1.68#						0.03	0.27	0.02	0.09#
10			0.48	0.39								0.83#
11		0.33*				0.17						
12	0.12*	0.08*		0.09	0.11	0.05						
13			0.05	0.65		0.06		1.02	0.01			
14						0.06		0.13				
15			0.11		0.40		0.12					
16			0.50*	0.77	0.71				0.03			
17	1.76#				0.03		0.49	2.70	0.40			0.33#
18			0.17*	0.03	0.01			0.77		0.03	0.03	
19				0.18								
20							0.18			0.42		
21		0.14	0.75#			0.11		1.55	0.73		1.53	
22			0.10*		0.02		1.00	0.77	0.52			1.10
23		0.47#			0.05		1.68				*0.02	1.16
24		0.21#			0.13	0.69			0.06			
25	0.11*	0.16*		0.08	0.33	0.17						
26	0.01*	0.14*		0.01			0.02		0.03			
27	0.51#		0.68*	1.00			0.76		0.97		#1.05	
m28	0.95					0.15	1.43	0.22	0.08		0.61	
29			0.26*			0.52						
30				0.53			0.06					
31										0.17		0.46
SUM Precip.	5.29	2.29	6.13	4.56	3.32	2.47	6.39	7.43	2.86	1.07	3.52	5.81
SUM Snow-fall	34.50	23.50	26.00	—						—	4.50	3.50

Total Precipitation for the Year 51.14

Total Snowfall for the Year 92.00

* Snow

\# Snow, Rain & Sleet

T Trace

Station Established 11-1-73

Co-ordinate Location of Station 42°-28'-00

Latitude 72°-12'-30"

ORANGE (ORW) 63
Start year of record - 1985
Land-surface elevation 530 ft, well depth 23.0 ft
Lithology - SAND
Topographic setting - TERRACE
Remarks - none
Period of record - HIGH (OWmax) 5.20 LOW 8.44 (OWr) 3.24

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
HIGH	6.60	6.77	6.17	5.30	5.65	5.20	6.43	6.10	6.68	5.68	6.14	5.86
LOW	8.07	8.25	8.44	7.65	7.93	8.13	8.19	8.22	8.40	8.35	7.85	7.57
MEAN	7.46	7.71	7.27	6.66	6.68	7.07	7.55	7.28	7.58	7.46	7.24	6.98

OTIS (OTW) 7
Start year of record - 1965
Land-surface elevation 1145 ft, well depth 18.0 ft
Lithology - SAND
Topographic setting - VALLEY
Remarks - Water level affected by Minor Brook and Farmington River
Period of record - HIGH (OWmax) 4.55 LOW 10.16 (OWr) 5.61

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
HIGH	6.81	5.96	5.26	4.55	6.28	5.85	7.14	8.20	7.71	6.75	6.64	5.54
LOW	9.43	9.33	9.06	8.55	9.02	9.45	9.92	9.93	10.16	9.94	9.43	8.85
MEAN	8.37	8.02	6.97	7.05	7.81	8.48	9.06	9.24	9.26	8.73	8.15	7.98

PELHAM (PDW) 23
Start year of record - 1984 (daily water-level record October 1991 to present)
Land-surface elevation 939 ft, well depth 740 ft
Lithology - ROCK (not recommended for use in estimating water levels)
Topographic setting - HILLSIDE
Remarks - none
Period of record - HIGH (OWmax) 9.44 (from daily record) LOW 15.73 (OWr) 5.96

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
HIGH	10.38	10.54	9.76	10.52	11.37	11.54	12.00	12.39	12.01	10.33	10.59	10.50
LOW	12.23	12.20	12.05	12.08	12.58	13.93	14.63	15.42	15.73	13.90	12.98	11.95
MEAN	11.27	11.21	10.89	11.39	12.15	12.85	13.48	13.33	13.48	12.24	11.39	11.15

PELHAM (PDW) 24
Start year of record - 1984
Land-surface elevation 940 ft, well depth 25.0 ft
Lithology - SAND
Topographic setting - HILLSIDE
Remarks - none
Period of record - HIGH (OWmax) 1.80 LOW 7.44 (OWr) 5.12

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
HIGH	3.58	3.08	1.80	2.32	2.30	3.19	4.17	3.98	3.43	2.40	3.15	2.88
LOW	5.05	4.65	4.92	4.15	4.47	5.32	6.71	7.44	7.12	6.62	5.32	4.77
MEAN	4.24	3.74	3.16	3.20	3.61	4.63	5.39	5.15	5.16	4.87	4.00	3.84

PETERSHAM (PHW) 16
Start year of record - 1984
Land-surface elevation 790 ft, well depth 39.0 ft
Lithology - TILL
Topographic setting - HILLSIDE
Remarks - none
Period of record - HIGH (OWmax) 4.71 LOW 16.53 (OWr) 10.74

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
HIGH	12.75	7.93	5.91	7.22	4.71	11.81	12.24	13.50	14.02	10.66	12.29	10.92
LOW	14.85	14.50	14.70	13.48	14.29	14.71	15.40	16.00	16.44	16.53	15.93	14.86
MEAN	13.67	13.14	12.19	11.17	12.04	13.95	14.53	14.87	15.17	14.50	13.96	12.84

Hop Brook/Boat Cove Tributary
Field Survey Report
October 13, 1995

written by: Scott A. Campbell, EEI

Fecal coliform counts of 600 per 100 ML M.F. detected in Hop Brook and the Boat Cove tributary prompted follow-up sampling and inspections of the surrounding area on October 12, 1995. Results had shown that coliform levels had returned to typical background ranges within just two days following the initial sampling. Surveys of the surrounding area suggest that the sources of the fecal coliform can be traced to animal sources, believed to have been carried to or downstream in the brook as a result of storm events that had occurred the prior week. Provided below is a brief discussion of sampling results and findings during the two sanitary surveys.

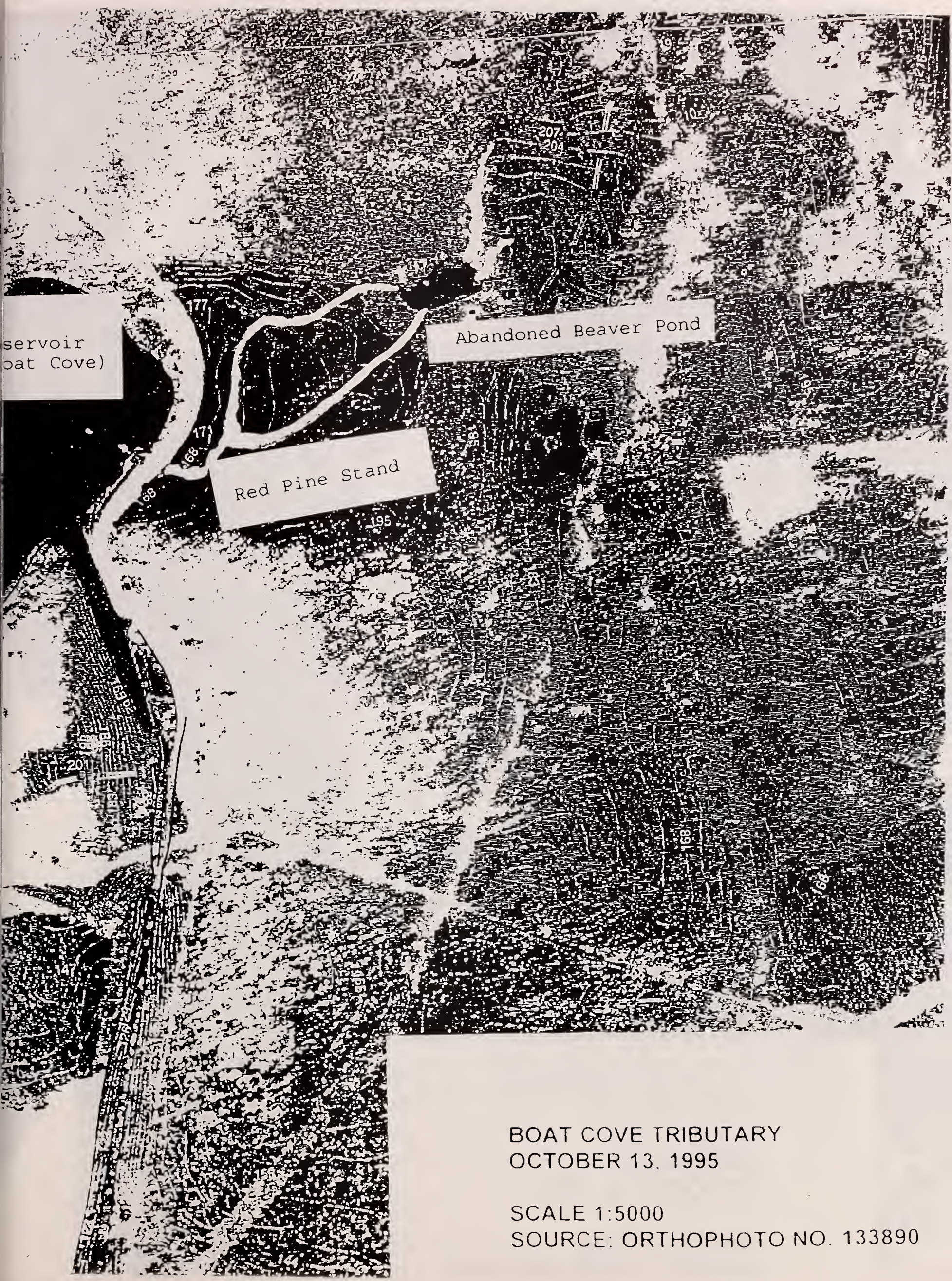
FECAL COLIFORM RESULTS

High fecal coliform levels were originally detected in samples collected on October 10, 1995, the third day of dry conditions following a four day period in which four inches of rain had fallen. It is suspected that follow up samples collected on the 12th represented the tail end of a bacterial pulse that appears to have been stretched over a span of eight days. The eight day pulse might have begun and peaked following the second consecutive day of rainfall when 3.53" of rain had fallen. The rainfall would have had little chance of infiltrating into the ground surface that had been saturated by the previous day's 0.35" rainfall. As a result, a significant amount of untreated surface runoff was allowed to drain from the receiving area and shock the banks of the two brooks.

FIELD SURVEY

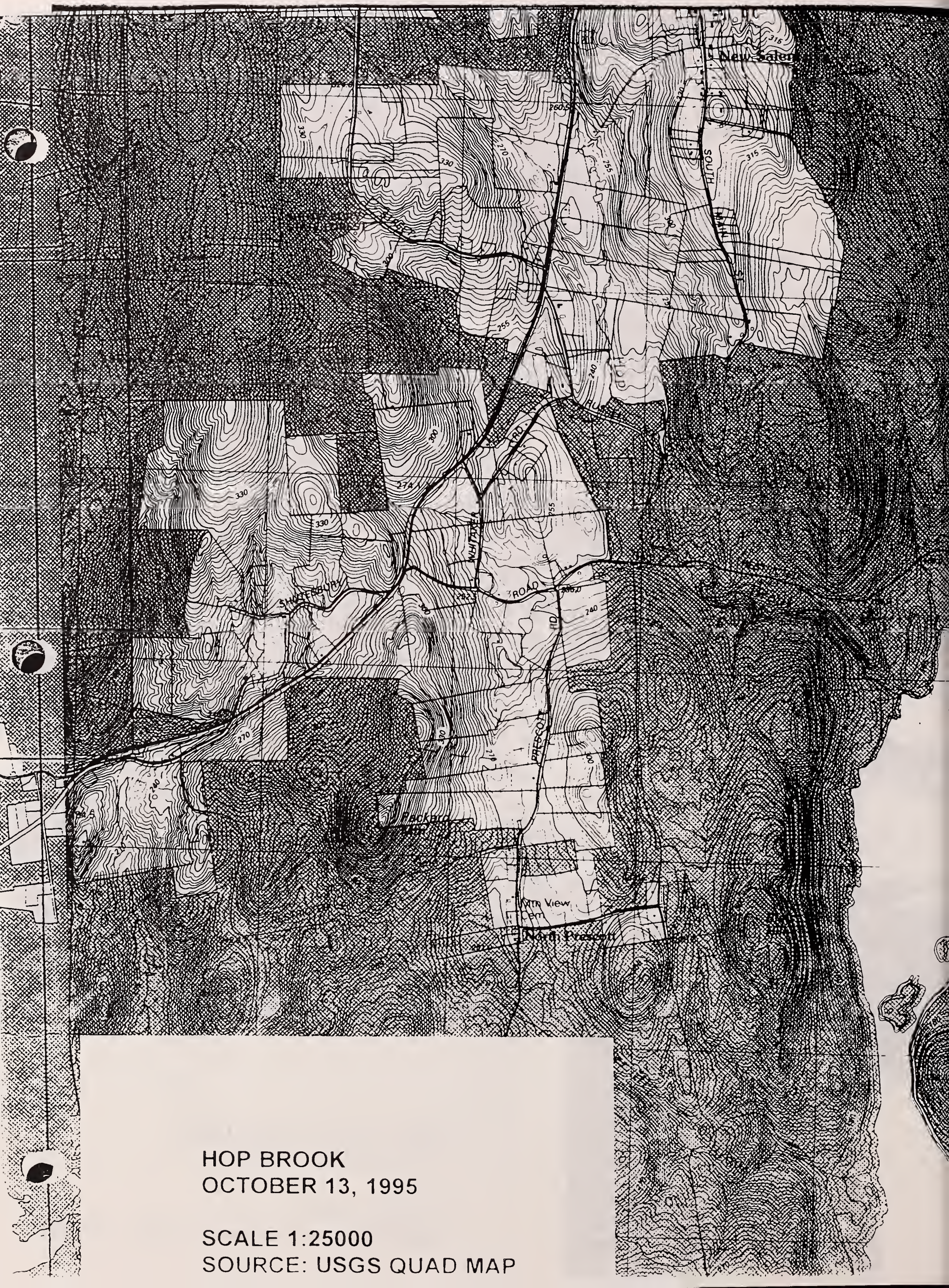
The Boat Cove tributary is a small tributary that drains the southern side of Quabbin Hill (see figure 1). All of the surrounding watershed land is owned by the MDC and has remained virtually free of development (the one exception being the Quabbin Tower and associated buildings). Hop Brook is a large tributary comprised of a network of nine branches that originate in undeveloped confines or lightly populated residential areas of New Salem. As one compares the steep terrain and predominantly pine overstory of the Boat Cove tributary to the lush, predominantly wet hardwood forest of Hop Brook, the sharp contrast in flow and watershed land characteristics becomes clear. Despite these differences, both have been found to experience similar impacts from wildlife populations and are regarded as being impacted minimally from outside human development.

Based upon field surveys it is suspected that active beavers upstream of the Hop Brook sample site contributed to the fecal load as shoreline areas would have been washed clean and dammed pools disturbed, resulting in what may be referred to as a direct discharge of fecal coliform. The fecal coliform source at the Boat Cove could not be readily identified despite a thorough investigation that extended up into the headwaters of the brook. However, sources of fecal coliform were abundant in the surrounding area as a result of an abundant wildlife habitat (12 deer encountered and previous accounts of Muskrat observations by MDC staff) and the recreational development in the area (human feces and manure discovered along one of the two developed trails surrounding and crossing the brook). Despite the apparent distinctions in how the contaminant was introduced into the water (i.e. overland flow versus a direct discharge of pollutant into the water), fecal coliform levels were initially found to be at the same concentration levels within the two brooks. One possible explanation for this phenomenon looks at the vast difference in flows between the trickling Boat Cove tributary and bubbling Hop Brook, which may have tainted or exaggerated the results seen in the Boat Cove.



BOAT COVE TRIBUTARY
OCTOBER 13, 1995

SCALE 1:5000
SOURCE: ORTHOPHOTO NO. 133890



HOP BROOK
OCTOBER 13, 1995

SCALE 1:25000
SOURCE: USGS QUAD MAP

CVA - Elevated Total Coliform Levels
Field Survey Report
December 1995

written by: Scott A. Campbell, EEI

Over the last two years a trend of elevated total coliform levels has developed in Massachusetts Water Resources Authority (MWRA) water samples collected from the Chicopee Valley Aqueduct (CVA). The total coliform bacteria spikes occur randomly and appear to be isolated to Fall months. The disturbing trend has prompted an investigative search to find the source of the bacterial contamination. Particular focus has been placed upon falltime reservoir conditions, intake flows, and MWRA maintenance practices. Other traditional sources of contamination such as wildlife, sampling procedures, and storm events have been ruled out based upon there consistence throughout any given year and the absence of a significant fecal contamination source found within the immediate vicinity of the CVA. Initial findings have suggest that coliform colonies are undergoing aftergrowths within the intake structure pipeline. However, the reasoning behind why they are experiencing the growth solely in the fall (cyclic?), and the element triggering the multiplication requires further study and additional water quality sampling to confirm these presumptions and explain the behavior.

MWRA MAINTENANCE

Maintenance operations conducted on the CVA pipeline include an annual intake valve turning exercise in February and a semi annual (Spring and Fall time) exercising of air relief and blow off valves located along the Aqueduct. In addition, intake screens are washed each Friday at roughly 10 AM (it should be noted that MWRA samples are typically collected from the power station around 10:30 AM). The pipeline from the intake building to the power station operates maintenance free. According to MWRA staff, this routine along with the set intake elevation has remained constants for over 30 years.

As part of the review of maintenance practices an intake screen washing exercise was witnessed. At the time, only a single crayfish had been trapped within the screens. MWRA staff had said that the lack of debris in the screens has been common over the past few years. However, in the past, fish (particularly smelt), debris, and algae were routinely collected within the intake screens at moderately low levels. While the decline in reservoir fish numbers and smelt has been well documented in previous studies conducted on the reservoir (Keller, 1987), the lack of debris and

algae may signify that water is being withdrawn from different elevations within the reservoir. For instance, a heavy collection of trash, algae and other fishing debris (rare but not unheard of) may indicate that water is being taken from near the surface. On several occasions, a small funnel has been observed directly over the intake clearly showing that water close to the surface was being drawn into the intake. Many factors such as wind action, water temperatures, inflow levels and reservoir elevations may influence how water is being drawn into the intake and ultimately, the quality of that water. These factors were scrutinized more closely as falltime reservoir conditions were evaluated below.

SWIFT RIVER DISCHARGES

Swift River discharges are controlled by flows within the Connecticut River, thus, discharges are known to vary considerably (by as much as 50 million gallons per day) on a daily and yearly basis. Beginning in the early Fall of 1991, a trend of consistently elevated (14 consecutive days in which discharge exceeded 60 MGD) Swift River discharges developed and continued up until early winter of 1992 when a fire damaged a generator in the power station. It was not until 1994, during a time when repairs were being made to Goodnough Dike and reservoir levels were dropped, did one see the return of elevated discharges throughout the Fall months. At the same time, a period of high total coliform levels (>500/100 M.L. M.F.) became common and apparently followed the change in discharge characteristics. Quabbin Reservoir flows were searched dating back to 1988 and MWRA coliform bacteria results were able to be compared from 1991 to present. The records search revealed that, with the exception of Fall 1991, there was a strong correlation between elevated discharges in the early fall and elevated total coliform levels. The search also showed that total coliform levels receded as the Fall progressed even though bypass discharges remained relatively high throughout the Fall. This fact suggests that another factor other than discharge is contributing to the bacterial surge.

RESERVOIR CONDITIONS

During the Fall months the reservoir experiences what is commonly referred to as an autumnal circulation (or turnover). This essentially means that surface waters begin to cool off and sink, resulting in a mixing action with the cool, deep waters. This process continues until a uniform temperature is reached across the depth of the reservoir. Within Quabbin, depth temperatures begin to approach uniformity by mid October. Laboratory staff have based this assumption on lowered pH levels seen at that time. It should also be noted that pH levels in the hypolimnion typically dip below 6.0 during mid to late September. The significance of this dip is not yet apparent but studies at Cranberry Lake in New York have identified a sulfate reducing bacteria that thrives under these conditions.

The overturning process is reversed in the Spring as surface waters are chilled by ice and air temperatures, causing them to sink to the bottom. Figure 1 looks at September reservoir temperature profiles (data was obtained from the 2nd or 3rd week in September of each year) for five years representative of various discharge and climatological conditions. As delineated in Figure 1, a thermocline is historically present during this month and typically falls in between elevations at 490 and 469 feet. It will not be until early November before one fails to see the presence of the thermocline signifying that a uniform temperature has been obtained in the water.

The Fall is also typically a time when summertime drought conditions reflect in low reservoir elevations and greater releases to the Swift River as highlighted above. While the two conditions are typically related, it is not uncommon for either of the two conditions to exist absent of the other. As an example, one can see that conditions in September of 1991 were such that discharges exceeded 60 mgd each day of the month. Yet, reservoir elevations only dipped to 95.7% capacity. In comparison, reservoir capacity dropped to 89% in the late Fall of 1994 (early Fall was above 90%) and a mere 85% in 1995. The significance of elevation differences is not known at this time. However, it is apparent that reservoir depths effect temperature profiles, which in turn can influence the range in which water is being drawn into the intake structure. A comparison between temperature profiles at the 202 sample site over a period of six years (Figure 1) reveals that mixing action may be accelerated and occur closer to the surface (i.e. further from the intake) in deeper waters. The result of such action may be highly diluted surface water inflows to the intake structure. This theory using dilution as the means to reduce coliform concentrations and nutrient loads, would explain why coliform levels were not observed to escalate during the Fall of 1991. Other observations included the fact that depth temperatures were shown to vary by as much as 7°C. The variability is believed to be dependant upon reservoir elevations and seasonal weather conditions. Also, by looking at the convergence of the three profiles for the years in which pumping was elevated (1991, 1994, and 1995), it would appear that pumping conditions do effect temperature profiles below the intake structure. Nevertheless, the effect of discharge conditions on waters above the intake is not apparent, but, it is believed that temperature profiles can be used to trace flows favorable to bacterial growth.

BACTERIA SOURCE

While the information presented above may provide some insight as to why the bacteria can and cannot be found in water samples at various times throughout the years, it fails to address the source of the bacteria and its route of travel. Total coliform bacteria can be representative of a wide spectrum of sources ranging from mammals to plants. It is generally assumed that bacterial

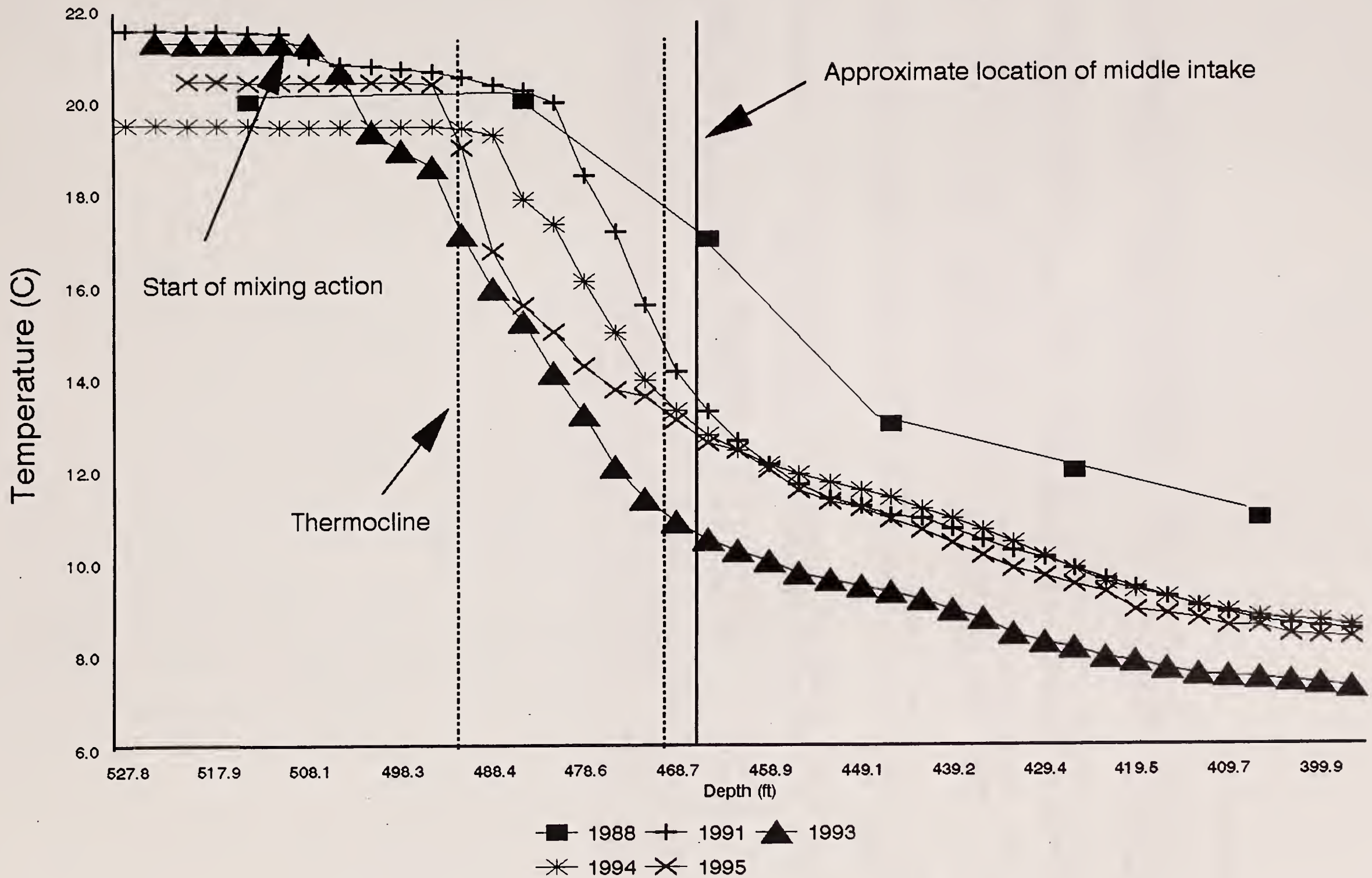
pollutants upstream of the intake, under ideal conditions (minimal wind, etc..), will become diluted and settle prior to impacting the intake structure. With the absence of a significant bacterial source in close proximity to the intake, one is left to believe that the contamination is emanating closer to the sampling source, possibly within the pipeline itself. Similar total coliform bacterial events have been documented in the distribution systems of other water supply systems. For instance, the town of Marblehead, MA (an MWRA supplied community) experienced repeated identification of total coliform bacteria traced back to biofilm collected within the old cast iron water mains (NEWWA, 1994).

CLOSING REMARKS

Coliform bacteria are free living organisms that can become attached to ropes, wood, sediments and other structures such as the inside of pipes. These organisms can be found naturally within water and their use as indicators of pathogens are limited by the fact that their presence within the environment is widespread. Under ideal temperature conditions and with an ample supply of nutrients, coliforms may experience aftergrowths which allow the organisms to multiply in numbers. It has been shown that the conditions, both inside of the CVA pipeline and within the reservoir during falltime turnover, are capable of harboring the bacteria at elevated levels. Further sampling should then be conducted upstream (and possibly downstream in the Swift River) of the 201 sample site in an attempt to isolate the source of total coliform bacteria. This can be accomplished by collecting water samples from within the intake structure itself through the intake screen washing system. Reservoir depth samples could also be collected from a point on the reservoir above the intake screen. Analysis at each sample site should include coliforms, temperature, pH, dissolved oxygen, and possibly aluminum. Each parameter has been shown to vary with depth in the reservoir, thus, a better understanding of these factors may also provide further insight into the effect that discharge conditions have on water quality. From the information obtained appropriate recommendations can then be formulated.

QUABBIN TEMPERATURE PROFILES (SS 202)

MONTH OF SEPTEMBER



References:

Richard Yuretich, August, 1992. Impacts of Acid Deposition on Watersheds of the Quabbin Reservoir. Water Resources Research Center, University of Massachusetts, Amherst.

American Public Health Association, 1992. Standard Methods for the Examination of Water and Wastewater - 18th edition. Washington, D.C..

Metropolitan District Commission and Massachusetts Water Resources Authority, 1991a. Watershed Protection Plan for Quabbin and Ware River Watershed. Prepared with the assistance of Rizzo Associates, Inc.

Massachusetts Department of Environmental Protection, 1990. Massachusetts Surface Water Quality Standards. Division of Water Pollution Control, Westboro, MA.

Metropolitan District Commission, Quabbin Reservoir Watershed Report. Division of Watershed Management, Belchertown, MA.

Keller, Richard L., August, 1987. Acidification and Fish Harvest Trends at Quabbin Reservoir. Massachusetts Division of Fisheries and Wildlife.

Metropolitan District Commission/Department of Environmental Protection, November 1990. Quabbin Tributaries Water Quality Data Report 1989-1990. Division of Water Pollution Control, Westborough, MA with the assistance of the Division of Watershed Management, Boston.

2975 03

ACME
BOOKBINDING CO., INC.

APR 4 2002

100 CAMBRIDGE STREET
CHARLESTOWN, MA 02129